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VOLUME XXI

NUMBER 1

JULY 1955

PUBLISHED BY THE SOCIETY
FOR AMERICAN ARCHAEOLOGY

CENTIMETERS INCHES

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American Antiquity is published by the SOCIETY FOR AMERICAN ARCHAEOLOGY during the months of January, April, July, and October. Subscription is by membership; annual dues are $6.00, of which $5.00 is for a subscription to *American Antiquity* and other publications as issued.

American Antiquity is printed by the University of Utah Press, University of Utah, Salt Lake City 12, Utah.

Entered as second-class matter June 1, 1951, at the post office at Salt Lake City, Utah, under the Act of March 3, 1879.

Articles and "Facts and Comments" should be submitted to the Editor, reviews and publications for review to the Associate Editor. Information for "Notes and News" should be sent to the appropriate Assistant Editor.

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AMERICAN ANTIQUITY

VOL. XXI JULY, 1955 No. 1

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GREAT BASIN PREHISTORY: A REVIEW

JESSE D. JENNINGS AND EDWARD NORBECK

SINCE THE PUBLICATION of Steward's interpretations of Great Basin prehistory, which were based upon field research ending about 1935, no attempt has been made in published form to collate and analyze currently available data on the full range of the prehistory of the area. Steward's conclusions are thoughtful and represent conservative, sound reasoning upon the basis of the data available and the theories current at the time. As might reasonably be expected, however, subsequent findings have cast doubt upon some of his interpretations and have made others unacceptable. This paper is a brief attempt, deliberately kept at a general level, to review both old and new data, with special reference to the cultural relationships between the Great Basin and San Juan Anasazi, and to call attention to current developments and problems.

The expression "Great Basin," used in a strictly physiographic sense, means the area of internal drainage which embraces eastern California, most of Nevada, much of western Utah, part of southern Oregon, and extends into southern Idaho and southwestern Wyoming. As Steward notes (1940: 445), use of the term Great Basin in archaeology is in some ways unfortunate because similar natural and cultural areas extend over a much larger area. Inasmuch as the physiographic unit does not represent a discrete cultural entity, our data have sometimes been drawn from a wider geographic area; and our conclusions thus rest on rather far-flung data.

Ethnologically, the Great Basin has long been regarded as a "marginal," but distinct, culture area, and it is often subsumed in classification under the heading Intermontane with the Columbia Plateau as a second and similar subarea. Despite knowledge of sites of early habitation, the Great Basin has most frequently been accorded status in North American prehistory simply as a later and watered-down version of San Juan Anasazi. Conventionally, it is included in the geographic area given the name Northern Periphery (of San Juan Anasazi) by Steward. Anasazi influence is, to be sure, evident in the Great Basin but except during a brief period — brief as compared with the complete cultural time span of the area — the influence is neither strong nor applicable to the whole area. Even during the period of strongest influence, Anasazi-derived traits appear to be simply additions which are sometimes locally important but do not represent the core of Great Basin cultures. It is in connection with horticulture that the influence of Anasazi is the strongest and clearest, and the spread of horticulture coincidentally with other Anasazi traits may now be traced with somewhat greater assurance than in the past as the result of field research of the past 2 decades.

At the time Steward's field researches were concluded few sites had been identified in the Great Basin proper which were generally regarded as old enough clearly to warrant the label early man. The most notable exception was Gypsum Cave at the southern margin of the Basin (following the definition of the Great Basin we have used, actually just outside its margins). Sites to which some antiquity was attributed were caves in the Great Salt Lake region (Steward 1937) and the Bonneville Basin of northwest Utah (Steward 1940), the Pinto Basin and Lake Mohave finds, and various sites in Oregon (Cressman 1941, 1942, 1943, 1951). At one time Steward (1937: 119) attributed considerable antiquity to Black Rock Cave, near Salt Lake City, and also to other Basin cave sites. Subsequently, however, he took the view that sites in the Great Basin proper were probably of no great age because there was "no case of association with extinct fauna," because of the presumed recency of the types of projectile points they contained, and because the cave materials included "basketry and other evidence of Basket Maker influence" (1940: 459). Excavated sites which Steward in 1940 (p. 460) identified as representing pre-Anasazi cultures appear to have been limited in number to 2, both of them caves near Salt Lake City. Lovelock Cave in Nevada and the

Oregon cave sites, with the possible exception of Roaring Spring Cave, were regarded by Steward as dating from Basketmaker and post-Basketmaker times (1940: 461).

In short, human occupation of the Great Basin was thought by Steward, whose opinion carried the greatest weight, to have begun at an unspecified date of some but not great antiquity with simple cultures based upon hunting and gathering, and most of the sites of these cultures were contemporaneous with or later than the early Basketmaker culture of the Southwest.

Other culture complexes, Anasazi influenced and relying in part upon horticulture, appeared later in the Great Basin and it was sites of these cultures which were the best known and given the greatest attention in the literature.

One of Steward's problems in attempting to interpret the prehistory of the Great Basin was to explain the apparently simultaneous introduction of traits attributed to the Basketmaker and early Pueblo cultures. Steward searched southern Utah to find "where the Basketmaker and Pueblo cultures blended prior to their diffusion to the north" and concluded, "This survey seems to eliminate the regions under consideration" (Steward 1941a: 355). He also eliminated eastern Utah as the source of Northern Periphery culture for the reason that it lacked the specific northern traits and was more closely related to San Juan, and suggested that the source of the "original Northern Periphery culture" be sought in western Colorado or in extreme eastern Utah, areas which were then virtually unknown archaeologically (Steward 1941a: 355). Subsequent field research in these latter areas have revealed numerous habitation sites showing Anasazi influence, identified either as extensions of Anasazi proper or sites of the Anasazi-related Fremont culture (Baldwin 1947; Burgh and Scoggin 1948; Gillin 1938; Hunt 1953; Hunt and Wilson 1952; Lister 1951).

It appears now that Steward's search was in vain for the reason that the area of "original Northern Periphery culture" included the Northern Periphery itself. Anasazi traits were simply added in the Great Basin to a culture which was very similar, antecedent, and most probably ancestral to the early nonhorticultural cultures (including early Basketmaker) of the Southwest. On the basis of its antiquity, this culture may be called native to the Great Basin.

From present evidence, the Great Basin appears to be one of the areas of North America first inhabited by man. A brief, chronologically ordered statement of its prehistory, subdivided according to the prevailing mode of subsistence, appears to be as follows:

1. Desert culture — Peripheral Big Game Hunting
2. Desert culture — Horticultural
3. Historic Desert culture

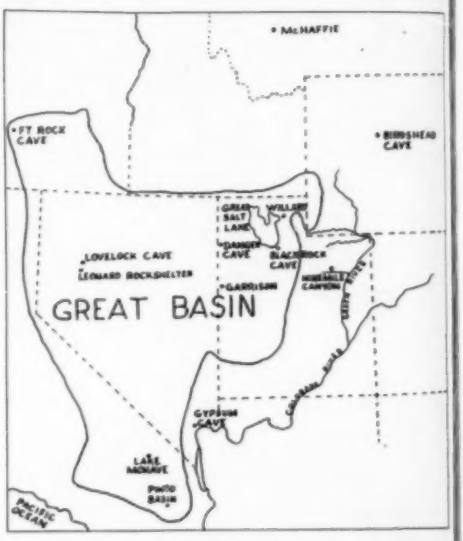

FIG. 1. Great Basin, after Steward.

Desert Culture—Peripheral Big Game Hunting. First occupation of the Great Basin begins earlier than 11,000 years ago (Jennings 1953), possibly before the termination of the Pleistocene period, a time when most of the west was inhabited by large game animals. The Great Basin, perhaps the first area of the west to undergo general desiccation, appears at this time already to be lacking the large "Pleistocene" animals such as the mammoth, ground sloth, horse, and camel. Man, using the spear-thrower and chipped projectile points as his chief tools, relied for subsistence upon such game as was available and upon gathered foods. Danger Cave, near Wendover, Utah, the site which, as this is written, has the oldest radiocarbon date for cultural materials in North America, contained remains of no large game except modern species of mountain sheep, bison, deer, and antelope.

By the end of the Pleistocene era, with continuing desiccation and the dwindling or disappearance of the lakes which intermittently

covered much of the area of the Great Basin, large game of any kind became scarce. Man relied upon smaller animals and, increasingly, upon vegetable resources, especially the seeds of grasses. Grinding stones, used to make wild grass seeds digestible, are the hallmark of this period and the weaving of baskets, sandals, and mats is a well-established trait (Jennings 1953). Certainly a desert way of life fundamentally like that of historic times was established early. Sandals found in Oregon have been given a radiocarbon date of approximately 9,000 years of antiquity.

Mention must also be made here of specialized cultures within the Basin during this period for which inclusion under the name Desert culture is inappropriate. Around the margins of the fresh-water lakes of the Great Basin there probably existed various more or less sedentary communities of people relying primarily upon the richer resources of the lakes and their shores and doing little foraging in the desert. Few data are as yet available on this subject but, judging from the finds at Humboldt Cave, Nevada (Heizer, personal communication), and from the occurrence of cultural specialization in nearby areas offering similar natural resources (Barrett 1910), it appears likely that future research will reveal a number of specialized lake sites in the Basin. We may reasonably expect that the cultural inventories of at least some lake-shore sites will, like Humboldt Cave, emphasize certain items, such as fish nets and fishhooks, which are less common in or absent from sites in the desert itself. We may reasonably expect more substantial dwellings than among more migratory groups and perhaps the use of watercraft in the form of reed rafts. Barrett has called attention to local specialization of this sort among the Klamath Lake and Modoc Indians of northeastern California and southern Oregon, whose foods and implements differ to some degree from those of their neighbors. He calls their culture "a specialized tule culture," and states, "In large part this specialization is the outcome of habitat in a restricted and unusual environment of large, shallow, inland lakes" (Barrett 1910: 259-60). We may, in short, expect to find, contemporaneous with sites of the Desert culture, enclaves of lacustrine specialization which appear and disappear as the lakes dwindle and grow or appear and disappear.

Throughout most of the area of the Great Basin, however, the pattern of living we have called the Desert culture is established. For nearly 10 millennia the same general pattern of life is followed, a nomadic wandering from valley to upland, to take best advantage of the resources of nature. Although regular seasonal routes are followed, there are no permanent or substantial dwellings. Caves and rock shelters are used intermittently and many of the habitation sites are open.

As the climate varied, man appears to have continued life with little change by means of adjustment to different altitudes. Essentially identical flora and fauna persisted to historic times, and following fluctuations in rainfall and lake levels, the range in altitude of man and the plants and animals he gathered and hunted also fluctuated. We think, as does Cressman (1951: 310), that, "Adaptation in the Great Basin did not mean extensive migration to a completely new area but movements within a region in terms of a relatively limited change in elevation of habitat." The same circumstances appear also to have applied to areas adjoining the Great Basin which have similar topography (for example, see Bliss 1950b).

The Desert culture was not restricted to the Great Basin but was the pattern found, following the disappearance of large game, throughout a wide area of the west surrounding the Basin. Local manifestations in the Southwest have been given such names as Cochise and Early Basketmaker. Martin states tentatively, "The cultures of the Basin and Pecos areas may represent a survival of a relatively uniform culture pattern that was once common to this area" (Martin and others 1952: 504). The finds of "Basin-like" materials, including rabbit-hair "cloth," fiber cordage, and grinding stones, at Birdshead Cave, Wyoming, suggest that the area embraced by the common culture is greater than Martin suspects. It will probably be found eventually that essentially the same culture pattern existed throughout the west as far north and east as the common physical environment extended. Mulloy, as a result of his researches in Wyoming and Montana, recognizes strong Basin influences in the northern Plains by 5000 or 6000 years ago (personal communication). According to currently available radiocarbon dates, this pattern of living occurs earliest in the Great Basin, and appears considerably later in the Southwest (Jennings 1953; Cressman 1951; Heizer 1951; Martin and others 1952). The pattern continued until historic times in the Great Basin together with a modification in late times in some areas brought about by the introduction of horti-

culture and other culture traits which were probably diffused from the San Juan Anasazi region.

At a time beginning perhaps later than the first evidence of man in the Great Basin, a large area of the continent peripheral to the Basin was inhabited by hunters of large animals, the so-called Pleistocene fauna. Evidence of man of this time is found at such sites as Clovis, Sandia, and Folsom, New Mexico; Ventana Cave and Naco, Arizona; Dent, Colorado; and at sites as distant from the Basin as Lime Creek, Nebraska; Plainview, Texas; and the MacHaffie site near Helena, Montana. Near the southern boundary of the Great Basin evidence of big-game hunters is also found at Gypsum Cave, Nevada. Unlike the early Basin finds, which are generally in caves and rock-shelters, most of these sites are open.

In comprehensive outlines of the prehistory of North America it is generally assumed that the first Americans were big-game hunters. Accepting this reasoning, the absence of remains of large, extinct fauna at all Great Basin sites suggests the presence of undiscovered complexes. If such sites exist, they are presumably of great antiquity. Heizer suggests that the apparent absence of bones of large, now extinct mammals may reflect only the fact that open sites, where such remains are most likely to be found, are scarce or buried and thus difficult to find (personal communication). The bodies of large animals, he states, were probably not transported into caves. Acknowledging the reasonableness of these statements, one might expect, nevertheless, to find within caves at least parts of skeletons or fragments of bone of large animals if they were hunted and eaten. It is possible, and we incline to this view, that the Pleistocene fauna was scarce or lacking at the time of first human occupation of the Great Basin and there may never have been a general distribution of big-game hunters in the Basin proper. Present data as to the age of various sites argue against the presence in the Great Basin prior to the Desert culture of cultures relying upon big game for subsistence.

Horticultural Desert Culture. After the growth from a common Desert-culture base of the horticultural civilizations of the Southwest, the domesticated plants — maize, beans, and squash or pumpkin — and various other traits usually attributed to the Anasazi spread widely to the north of the Anasazi area, becoming modified and adapted to local conditions. East of the Great Basin in the drainage area of the Colorado and Green rivers, extending to the vicinity of Vernal, Utah, and into northwestern Colorado on the Yampa River, a complex called the Fremont culture came into existence. Although the later stages of the Fremont culture appear to represent a blend between the native Desert culture and Anasazi, it also has traits of its own, including a distinctive moccasin and clay figurines, to say nothing of a race of corn distinct from the coeval Basketmaker type. The time span usually given to this culture is from approximately A.D. 400 to 600 to 1300 (Burgh and Scoggin 1948; Gillin 1938; Hunt 1953; Hunt and Wilson 1952; Lister 1951; Morss 1931). The beginning dates are probably several centuries earlier than the A.D. 400 suggested.

In the area of our chief interest the raising of maize, and probably beans and squash, also became established, but less reliance was placed upon these plants than in the more easterly area of the Fremont culture. Adobe dwellings, tubular pipes, pottery, gaming bones, and pecked stone balls, traits which appear almost certainly to be Anasazi-inspired, also appear. The name Puebloid, coined by Smith (1952: 1), has come into general use for the cultures and sometimes, unfortunately, in a tribal sense for the bearers of the cultures of this period. The time is late, perhaps A.D. 500 in some areas and as late as 1000 in others, and, as in the Fremont culture, the new way of life terminates abruptly at a time usually believed to be close to the end of the 13th century. The immediate provenience of the new traits is uncertain, perhaps from the Fremont area, perhaps directly from San Juan, probably from both areas.

The full distribution of horticulture within the Great Basin during this period is as yet unknown. Examination of site reports reveals less than a dozen at which the remains of domesticated plants were actually found. Rudy, in a recent survey of western Utah covering 194 sites, most of them unexcavated and some of them chronologically outside the horticultural period, reports finding domesticated plants (maize) at only 3 sites, all close to the Utah-Nevada boundary line and one of them just over the border in Nevada (1953: 162). Other sites in which finds of at least maize have been made include Etna Cave, Nevada (Wheeler 1942: 49), and mound sites at Beaver, Paragonah, and Kanosh in south-central and central Utah, Grantsville at the southern end of Great Salt Lake, and Willard at the northeast edge

of Great Salt Lake (Steward 1936: 54; Judd 1926: 5, 149). Taylor also reports the presence of maize in a mound site near Garrison, at the extreme western boundary of central Utah (Taylor 1954: 7). Rarer finds of beans and squash are also reported (Judd 1926: 5, 149).

Although, as noted above, some positive finds of domesticated plants have been made, the usual course has been for the archaeologist to assume the presence of horticulture wherever substantial dwellings were found in areas suited to the raising of crops. The presence of pottery seems sometimes to have led to an assumption that horticulture existed, although pottery existed widely throughout the Great Basin and can also be found considerably to the north in Idaho and Montana in areas which to this day have produced no evidence of horticulture. The manufacture of pottery in small quantities appears, in fact, to have continued in the Great Basin until historic times (Baldwin 1950; Heizer 1954). It seems justified, however, to assume the existence of horticulture when the cultural assemblage at a site includes substantial, permanent or semipermanent dwellings, the location is an area suitable for horticulture, and the visible remains are otherwise like those of Basin sites at which positive evidence of horticulture has been found. As yet only a few Basin sites have had investigation beyond surface inspection and testing. Most sites containing substantial dwellings which have been excavated have yielded at least the remains of maize.

All peoples of the Great Basin during the several centuries before 1300 did not practice horticulture. Steward's (1940: 468) statement that horticulture in this area "is restricted to cases" appears sound. From evidence at such sites as have been excavated, it appears that horticulture was important in some areas but that *all of the old subsistence technics of the Desert culture continued to be practiced.* We may say with assurance that during this period there was considerable reliance upon horticulture by the peoples of at least the eastern part of the Great Basin (western Utah), but that even in this area much of the old pattern of the Desert culture still obtained. For lack of data little may be said about the distribution of horticulture during this time in Nevada (excluding extreme southern Nevada, which was under strong Anasazi influence, and is outside the Great Basin). Steward's statement (1940: 467) that horticulture "thins out rapidly in the deserts of eastern Nevada" will no doubt be supported by future field research; the long valley of the Humboldt, however, should be carefully examined before Nevada can be written off as lacking horticulture.

It is the culture of this relatively short period which can with justification be given a name which indicates a relationship with San Juan Anasazi, although the name Northern Periphery does not seem appropriate because of its strictly areal connotation (see Rudy 1953: 168-9).

Just before the beginning of the 14th century the dwelling sites (chiefly mound sites; caves continued to be used intermittently by hunters and gatherers or by horticulturists on hunting and gathering expeditions) of the horticulturists were abandoned and horticulture disappeared from the Great Basin. The most common explanation offered is the displacement of the horticulturists by invading peoples from the north. Drought is sometimes also utilized as an explanation, or a combination of drought and expulsion by strange invaders. Steward (1938: 4) takes a firm stand against the theory that drought caused the abandonment of the horticultural sites, stating, "There is no reason to postulate economic failure." He bases his reasoning on the fact that no Anasazi traits later than Pueblo II are found in the area, and correlates the abandonment of Northern Periphery sites "with the collapse of Pueblo III in the south if not before" (1938: 4). The most probable explanation of the abandonment, he states, is inroads by hostile tribes or internecine warfare (Steward 1936: 62; 1940: 473-4).

A recent view, supported by data worthy of note, is that the abandonment was, after all, due to economic failure, a cycle of approximately 25 years of rainfall inadequate for the raising of crops, but that the Great Basin was never wholly abandoned (Rudy 1953). Climatic conditions in the Great Basin during this period are unknown, but some data are available on an area immediately adjacent. The area in question, Nine Mile Canyon, a site of the Fremont culture (which came to an end at the same time) in the western drainage of the Green River in northeastern Utah, is today climatically similar to the Great Basin and presumably was also similar in prehistoric times. Schulman's study of roof timbers in dwellings in Nine Mile Canyon indicates a period of drought from about 1270 to 1295 comparable

to but less severe than the drought which prevailed in the San Juan area from 1275 to 1299 (Schulman 1948). Rudy (1953: 170) states, "Prevailing movements of moisture into both northeastern and western Utah come from the west coast. If Nine Mile Canyon experienced a drouth, western Utah would also. It seems reasonably safe, then, to offer the hypothesis that, beginning with the year 1270 A.D., western Utah was subjected to a drouth severe enough to force the Puebloid groups to abandon their homes and small fields and return to reliance upon a gathering and hunting economy."

In his survey of western Utah, Rudy finds no evidence in the abandoned horticultural sites of burned dwellings or other signs of violence which might indicate warfare. He takes the view that following a climatically forced abandonment of horticulture full reliance was once again placed upon hunting and gathering.

> There is no indication that the population of any of the groups occupying western Utah was at any time large enough to enable them to displace one another. We know that in early historic times the climate and natural resources of Utah allowed only sparse habitation (Steward, 1938, 46-49); there is no reason to think that conditions were markedly different during the time span of the Puebloid culture. The small, wandering family groups which probably constituted the largest permanent social units could never have gathered in large enough bands to be a menace to small, semi-stable groups of people. Pressure from enemy groups, in short, seems unlikely. A change in climate leading to a change in economy seems the best hypothesis to account for the termination of the Puebloid culture. [Rudy 1953: 169.]

Other field research also supports the view that, although horticulture disappeared, the Great Basin was never wholly devoid of human population (Jennings 1953; Heizer 1951).

After the end of the 13th century no horticulture appears to have been practiced in the Great Basin until shortly before or about the time of the advent of the white man into the area. A number of bands of Southern Paiute and various other Shoshonean groups of Nevada and Utah practiced horticulture at the time of first historic recording, although some of the plants noted are Old World introductions. Burning of the ground to encourage wild plants, the broadcasting of seeds of wild plants, and also the diversion of water from streams to encourage the growth of wild plants are also reported as existing during historic times (Steward 1933c: 247-8; 1941b: 231-2; 1943: 303; Stewart 1941: 376; 1942: 234-5). The most northerly extension in historic times of the practice of horticulture appears to have been Spring, Antelope, and Snake valleys, in east-central Nevada extending into Utah (Steward 1938). For most groups which did practice horticulture at this time, hunting and gathering continued to be important.

Thus we conclude that horticulture, grafted onto an older life pattern, existed in the Great Basin for only a relatively brief period. Its disappearance was followed by a resumption, with little alteration, of the pattern of life of the old Desert culture, a pattern which had never wholly died out. The same sequence of events also occurred in the area of the old Fremont culture.

This view is in direct opposition to that of Steward, who states that the culture of recent peoples of the Great Basin cannot be regarded as a surviving substratum of any early widespread culture but was instead the product of diverse borrowing from different sources (Steward 1940: 45-51).

As for the identity of the bearers of the cultures when horticulture was practiced, the picture remains very unclear. Skeletal evidence has been of little aid; few skeletons have been found and these are difficult to interpret. Although Steward (1940) attributes only a very late date to the Shoshonean-speaking peoples inhabiting the area in historic times, more recent opinions leave the question open. The population of this time may have been ancestral to the historic Shoshone (Rudy 1953; Taylor 1954; Heizer 1951). It is also suggested on the basis of some finds of pottery, that it may have been Yuman or included Yuman groups (Rudy 1954; Taylor 1954). There might have been an actual influx of Anasazi people into the area (Rudy 1953: 168). Such data as are available appear to indicate that the horticulturists of the Great Basin were not identical in physical type with the people of the Anasazi culture nor were they identical with the modern Shoshone (Steward 1936; Enger and Blair 1947; Blair 1949; Buettner-Janusch 1954). The presence in stratigraphic association at many sites during the period of Horticultural Desert culture of pottery conventionally identified as Puebloid ware (presumably restricted to people of the Puebloid culture; that is, Horticultural Desert culture) and Shoshone ware (linked with pottery made by historic Shoshonean speakers) has been puzzling (Rudy 1953; Taylor 1954). Chipped stone artifacts and milling

stones are either insufficiently distinctive or, like the pottery, appear in such confusing association that they have not clarified the question.

The foregoing review brings to focus a number of points, some of which have recently been dealt with by Cressman, Hurt, Quimby, and Martin, pertinent to an interpretation of the prehistory of an area much larger than the Great Basin. They may be summarized as follows:

1. The Great Basin appears to be one of the areas of North America first occupied by man, beginning from a period at least 11,000 years ago.

2. Prior to the existence of the culture here labeled Desert culture-Horticulture, the Great Basin was part of a common culture (Desert culture) which embraced the Colorado Plateau, the Southwest, extended into the western High Plains including part of Texas, and the areas of California adjacent to the Basin, and may well have extended through the Ozarks into the Middle West, for example, the Barbeau Creek Rock Shelter of Illinois (Buettner-Janusch 1954).

3. Rather than being peripheral to and culturally dependent upon the Southwest, the Great Basin antedates and may be the cultural forebear of the cultures lumped together as Pueblo (Reed 1946, 1951). At least, basketry, woven bags, sandals, matting, fur blankets, the atlatl, and milling stones, once thought to have reached the Great Basin from the Basketmaker culture (Steward 1940: 452 and following) are found earlier within the Basin (Cressman 1951; Martin and others 1952; Heizer 1951; Jennings 1953). There are many other cultural correspondences or similarities between the Great Basin and various southwestern cultures later in time (for example, see Martin and others 1952: 503).

4. It appears increasingly clear that any scheme of prehistoric culture areas of western North America which embodies time depth must include culture areas of great geographic extent for the 2 early complexes (Big Game Hunting and the Desert culture), out of the latter of which arose the local specializations such as Mogollon and Anasazi.

5. The reasons for abandonment of horticultural sites in the Great Basin appear likely to have included drought, a factor given additional weight by the lack of evidence of displacing warfare. Questions that spring to mind in this connection are why horticulture was not subsequently resumed or why it should have wholly disappeared. One can surmise that there would be some movement of peoples during an extended drought, but it is difficult to imagine that the knowledge of horticulture would be entirely lost unless there were considerable displacement of peoples and loss of numbers, and subsequent severing of contact with the now shrunken Anasazi area. It seems reasonable to think that even during a long drought there were favored areas, such as the lower courses of the Bear, Provo, and Weber rivers in the Great Basin, which flow from the high Uintah range of eastern Utah (and also areas along the Green and Colorado rivers in the area of the Fremont culture), where horticulture could have been practiced. Or again, the complete drying of the Humboldt seems doubtful; agriculture should have been possible in this valley. Perhaps after a drought-forced resumption of the subsistence patterns of the old Desert culture, hunting and gathering assumed a greater value so that there was no incentive to return to horticulture. Various groups of hunters and gatherers throughout the world, such as the pygmy Negroes, have for millennia been acquainted with agriculture but never adopted it. It is worthy of note that during historic times within the Great Basin nonhorticultural tribes lived as neighbors of tribes with horticulture, and, although presumably fully cognizant of the practice, never assumed it themselves (Stewart 1942: 234).

We have no assurance that the terminal date commonly assigned to the Great Basin horticultural sites is accurate. There are as yet no radiocarbon dates, and the common statement that horticulture ended in the Great Basin close to the end of the 13th century is probably strongly influenced by data from San Juan Anasazi. Even in the San Juan area, certain sites were abandoned over a century before the drought (O'Bryan 1952: 153), and perhaps the same circumstances applied in the Great Basin.

O'Bryan (1952: 154), referring to the northern pueblos, states that the drought theory " . . . does not stand close scrutiny, although the cluster of dry years may have been the final misfortune to cause the desertion of certain already insecure settlements." This is perhaps the most reasonable view with respect to the Great Basin horticultural sites.

6. The name Northern Periphery as applied to the Great Basin is no longer acceptable. The implications of the term apply to most of the Colorado Plateau (the Fremont culture) for the better part of a millennium, but one millennium represents only a small fraction of the total period of prehistoric occupancy of this area. The term is more poorly suited to the Great Basin cultures, which appear to have been under fairly strong cultural influence stemming ultimately from Anasazi for only a few centuries.

Objection to the term Northern Periphery lies in part, of course, in the point of reference. If one is dealing primarily with the prehistory of the Great Basin or the Fremont culture area, the name is inappropriate. Given time depth, it seems more apt in recounting the prehistory of San Juan Anasazi.

No mention has been made herein of the work of Carter, Clements, Simpson, and others with what they believe are pre-Desert culture chopper cultures. We are inclined to think that these complexes will eventually be demonstrated to be valid, but for this essay we have chosen to ignore these finds.

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October, 1954

CONTRIBUTIONS TO THE ARCHAEOLOGY OF NORTHERN HONSHU

PART I, JOMON SITES IN AOMORI PREFECTURE

HOWARD A. MACCORD

IN VIEW OF the considerable interest currently manifest in the role played by the northern Pacific area in the peopling of and spread of cultural traits to the New World, recent finds in the north of Japan should prove of interest to American archaeologists and students. While several excellent summaries of Japan's prehistory are available (Munro 1908; Groot 1951; Kraus 1947, 1953) it is felt that many students would appreciate an opportunity to read site reports in the original in order to draw their own conclusions. The scarcity of such reports outside the Japanese language is, to most Americans, an insurmountable obstacle. It is hoped that the present series of articles will, in a small way, help to ameliorate this condition. The explorations described in this series were made during the writer's stay in Japan during 1948 to 1950. Cultural materials collected are deposited in the U.S. National Museum, where additional notes, maps, sketches, and unpublished photographs are available. Throughout these articles, the 6-digit number in parentheses following the reference to a specimen is the accession number of the U.S.N.M.

To acquaint the reader with the broader aspects of Japan's Neolithic period, it is thought desirable to summarize the sequence of subperiods as outlined in Groot's "Prehistory of Japan." This sequence is accepted by the majority of Japanese archaeologists and may be used conveniently by the reader as a frame of reference for the site descriptions to follow. Remains definitely Paleolithic have *not* been found in Japan, though these may be expected in view of postulated land connections between Japan and mainland Asia during Pleistocene times. The earliest remains known are true "Neolithic," representing a sedentary, pottery-using population. The pottery is almost always cord marked, and this characteristic, called "Jomon" in Japanese, gives its name to the culture and the period. The Jomon period is thought to have endured for about 4000 years in most of Japan, with a 400 to 500 year lag in the north of Honshu and on Hokkaido. For convenience, this 4000 year span is subdivided into 5 subperiods, based mainly on pottery differences.

The earliest is called the Proto-Jomon and is thought to have lasted from about 4000 B.C. to 3000 B.C. It is characterized by scattered house sites and small camps, usually marked by shellheaps. Pottery vessels have pointed or conoidal bases and are grit or fiber tempered. They are usually decorated with impressions of a shell or a carved stick, though a few are cord impressed. Stone implements are either chipped or polished. Groot equates this period with the Mesolithic in northern Europe.

The Early Jomon followed the Proto-Jomon and lasted until about 2000 B.C. Pottery in this period is flat bottomed, and more elaborate forms and varieties of surface treatment appear. The ware is either grit or fiber tempered. Sites are usually shellheaps and are slightly larger than those of the Proto-Jomon. Stone implements show no change, but a more diversified bone industry is found.

The Middle Jomon is typified by larger and deeper shellheaps, and large, elaborate pottery forms. Magico-religious traits appear, such as female figurines of clay, stone batons, cylindrical stones planted upright in house shrines, incense burners, and burials with grave offerings of shell, antler, and jade. This period is thought to have lasted until about 1000 B.C.

The Later Jomon carries on the traditions of the Middle Jomon, but pottery forms become less ornate in rim and surface treatment, though more varied in shape and size. Sites are predominantly shellheaps and are large and numerous. This period endured for about 500 years.

The Final Jomon followed the Later Jomon and continued the patterns of large sites and diverse pottery forms. A multitude of non-pottery art forms develop. These include beads, bracelets, pendants, earplugs, lacquered wooden objects, and tooth mutilation. Urn burial of infants is found, and burials covered with iron oxides are common. This period ended in southern Japan around 100 B.C. when influences from the continent brought in differing pottery types, use of bronze, the domesticated horse, and wet-rice culture. These traits mark the period called "Yayoi" by the Japanese. In the north of Honshu and on Hokkaido, the Final Jomon seems to have lasted until about

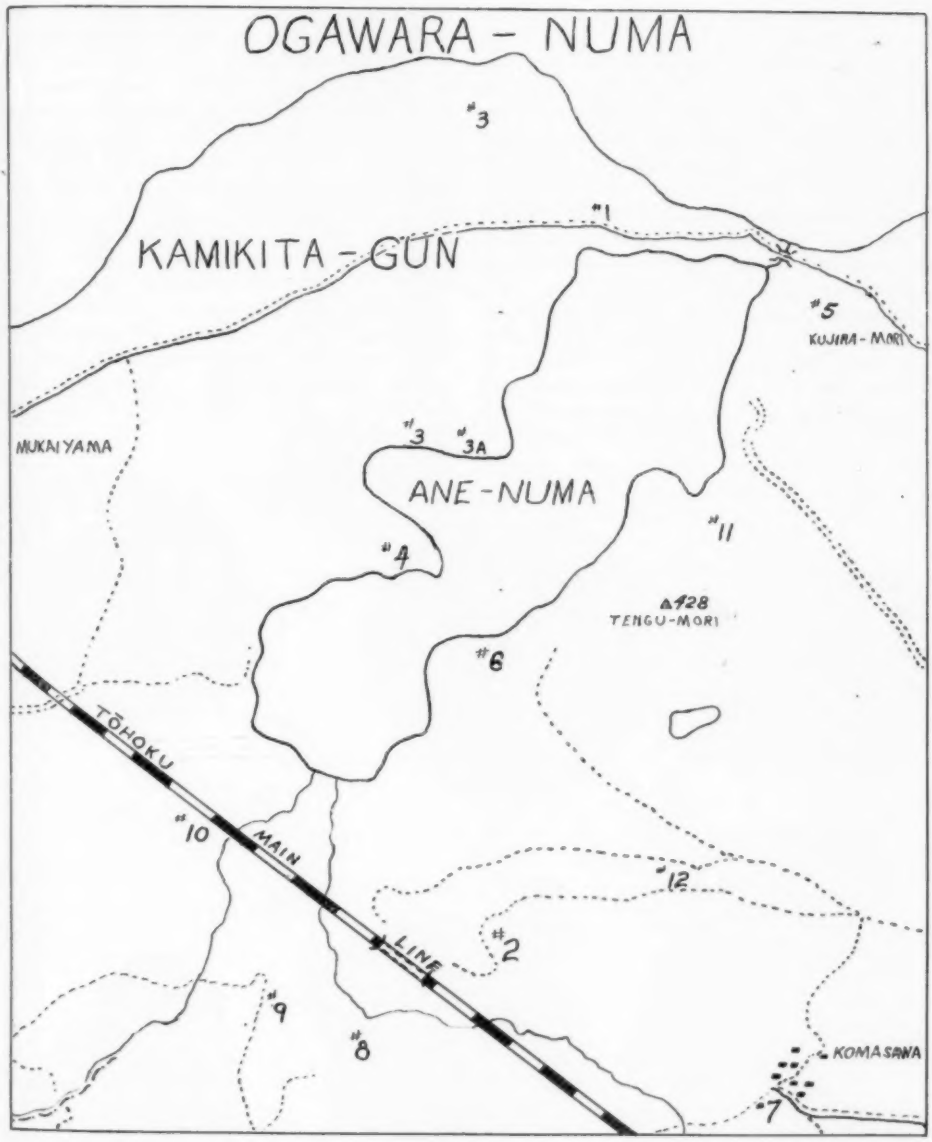

Fig. 2. Map of Anenuma area, northern Honshu, Japan, showing site locations. Scale, approximately 5 inches equal one mile.

A.D. 500, when it was superseded by an iron-using culture of the Haji period, equivalent to the protohistoric and early historic periods of southern Japan.

The first article in this series will describe the Jomon period sites and materials found in the eastern portion of Aomori Prefecture. The second article will describe sites, house pits, and artifacts of the protohistoric Ogawara Pit-house culture (Haji period) in the same area of Aomori Prefecture. The third article will describe sites visited or explored in the vicinity of Sendai, Miyagi Prefecture, and on the east shore of Tokyo Bay in Chiba Prefecture.

Evidence of early occupation can be found everywhere along the bluffs fronting on Lakes Ane and Ogawara in the eastern portion of Aomori Prefecture. This evidence consists of potsherds, flint chips, fire-cracked stones, and occasional stone implements. Shellheaps are scarce, though the presence of a few indicate that shellfish were available. The majority of the sites are merely concentrations of non-organic refuse in the black topsoil, which sometimes reaches depths of 4 feet. In these deeper sites stratigraphical studies using statistical methods indicate the development of pottery types from Proto-through Later Jomon (Groot 1951). At many sites house pits of the protohistoric Haji period (Ogawara Pit-house culture) intrude into Jomon deposits. The sites located by the writer in the area are shown on the map, Figure 2. Where both Jomon and Haji components are present at a site, only the Jomon period component is described in this article. A total of 12 sites on Lake Ane and 5 sites on Lake Ogawara were found and recorded. Exploratory excavations were made in 8 of the 12 on Lake Ane and in one on Lake Ogawara.

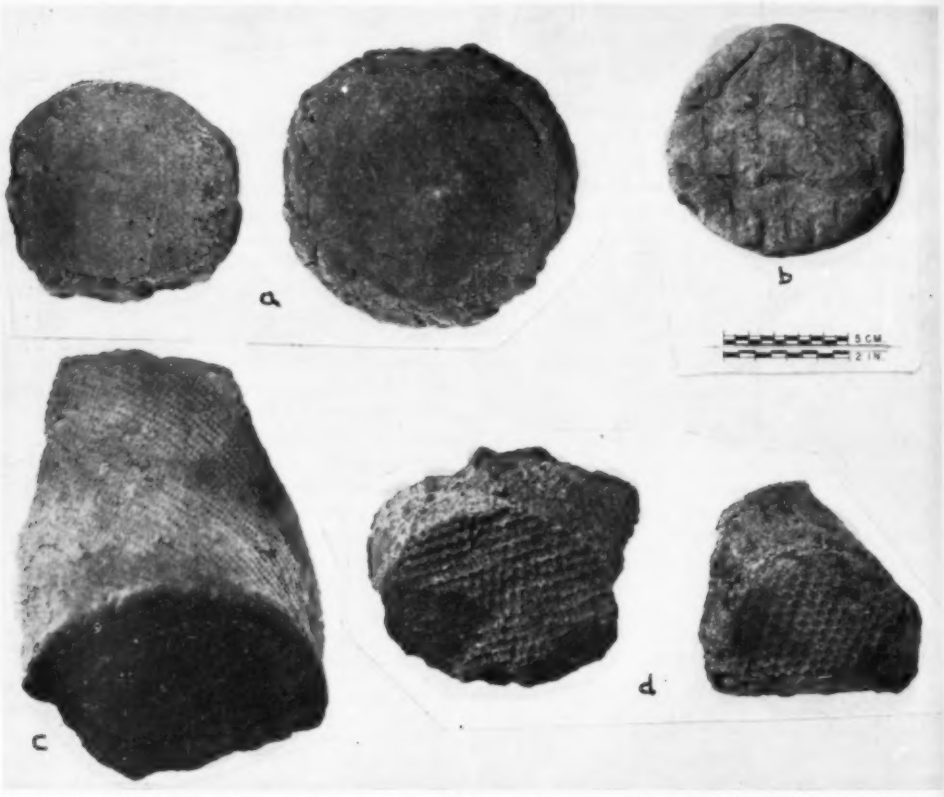

FIG. 3. Basal sherds from Jomon period pottery. *a*. Plain. *b*. Net impressed. *c*. Cord impressed. *d*. Bamboo mat impressed. USNM negatives 41879 and 41880.

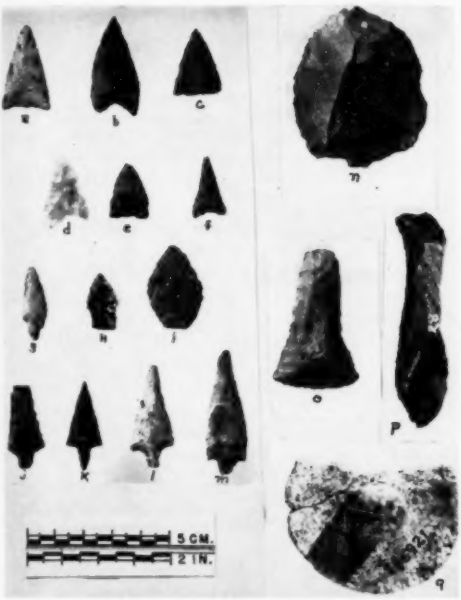

Fig. 4. Artifacts from northern Honshu. *a-m.* Arrowpoints. *n-p.* Flint scrapers. *q.* Pottery trowel.

Anenuma Site 1

Site 1 on Anenuma occupies the eastern tip of the point of land which separates Anenuma from its larger neighbor, Ogawara-Numa. (Numa means lake, usually estuarine and marshy in character.) The peninsula is 50 feet above lake level and has steep sides. Most of the site is occupied by houses built for military personnel of Misawa Air Force Base. The houses and their yards interfered with extensive excavation, limiting explorations to a test area on each side of the public road which passes in front of the houses. These areas, designated as Tests 1 and 2, were excavated to a depth of 2 feet to the clay hardpan. No pits, postmolds, or house pits were found, but scattered through the black topsoil were hundreds of Jomon-period sherds and other artifacts.

Test 1 measured 5 by 10 feet and lay parallel to the edge of the roadcut. It yielded, in addition to many scattered sherds and artifacts, a deposit of pottery, including 2 intact vessels, 1 complete but badly cracked vessel, and 2 nearly complete but nonrestorable vessels. With the vessels were 3 finely polished celts, 1 double-ended celt or chisel, and 2 chipped, flint scrapers. Adjacent to this deposit was a part of what had been a stone box or cist, made from slabs of sandstone 2 inches thick. The cist measured 8 inches wide, 5 inches deep, and was of unknown length, since part had been removed in road-building operations. No trace of a top or prepared bottom were found. No trace of fire existed in or near the cist, so that its use as a hearth may be ruled out. No connection could be found between the cist and the deposit of artifacts.

Test 2 was 10 feet wide by 25 feet long and was also excavated to hardpan. Hundreds of sherds were recovered, among which were 2 restorable vessels. Also recovered was a broken tripodal grinding stone or metate made from a porous lava (396925).

The miscellaneous sherds found on the surface and in the tested areas are identical and reveal the following information. Vase forms are of 2 types, (1) straight sided, flat bottomed without differentiated neck, and (2) globular with flat bottoms and constricted, vertical necks. Oral diameters range from 4½ to 10 inches,

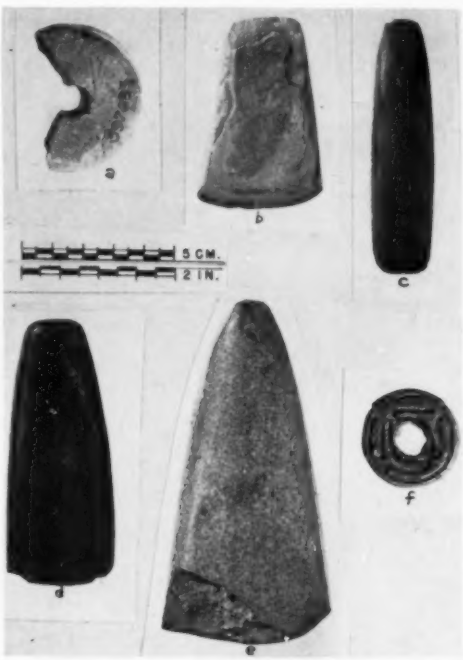

Fig. 5. Artifacts from northern Honshu. *a.* Clay spindle whorl, Ogawara Site 4. *b-d.* Celts and chisel, Anenuma Site 1. *e.* Celt, Anenuma Site 11. *f.* Clay pendant, Anenuma Site 3.

while basal diameters vary from 2¼ to 5 inches. Many bases show bamboo-mat impressions, some are cord or net impressed, and others are entirely plain (Fig. 3). Most of the ware had been made from grit-tempered clays, though in a few instances fibers had been used for tempering. Side walls vary from 3/32 to ½ inch in thickness. Both interior and exterior colors are red, yellow, buff, brown, gray, or black, or combinations of these colors. Sherds are often soot encrusted. Sherds are predominantly cord marked, though a few are smooth. The cord markings are either fine or coarse, with the finer types predominant. In some cases S-curves over the cord markings further embellish the ware. Designs were predominantly made by obliterating the cord impressions within incised designs, though punctations, doughnut-shaped buttons, strap handles, added rim strips, pseudo-cord lines, and simple incising on plain (as well as cord-marked surfaces) are included. Rims are rounded and straight, or square and straight in cross section. A few rims are gently crenelated. Rim tops are usually undecorated but sometimes are cord marked or show punctations. A few perforations for repair are present.

FIG. 6. Cord-marked vase from Anenuma Site 1, Test 1, Late Jomon period. USNM negative 41877.

In addition to the deposit of artifacts described above, Test 1 yielded the following artifacts:

31 rim sherds representing 24 vessels
18 basal sherds
150 body sherds
1 modeling trowel made of pottery, shaped like a mushroom (396921), (Fig. 4 *q*)
1 bell-like object (incomplete) made of clay (396927)

Test square 2 yielded 39 rim sherds representing 24 vessels, 26 basal sherds, and 558 body sherds.

Surface finds at Site 1 consisted of 48 rim sherds representing 45 vessels, 33 basal sherds, uncounted body sherds, 3 projectile points, and 1 hammerstone.

The projectile points are all made from flintlike materials and are usually not exceptionally well chipped. All points found are either small (½ to 1 inch) isosceles triangles or are slender, small-stemmed points about 1 inch long (Fig. 4 *a-m*). The hammerstone is pitted on opposite sides, while the periphery is battered. The stone implements found with the deposit of 5 vessels in test area 1 are as follows:

celt 1 (396919), dark green, metamorphic stone (Fig. 5 *d*)
celt 2 (396915), dark green, metamorphic stone
celt 3 (396916), light green, metamorphic stone (Fig. 5 *b*)
chisel, double-ended (396917), dark green, metamorphic stone (Fig. 5 *c*)
flint knife (396918), ovate, showing primary chipping only (Fig. 4 *n*)
flint scraper (396920), flared end (Fig. 4 *o*)

Description of Vessels. Vessel 1 (396909), Test 1, is a simple vase with straight sides and flat bottom. Over-all height is 2¾ inches. The base and orifice are both 2½ inches in diameter. Sides are 3/32 inch thick, red and black both inside and out. The paste is grit tempered, and poorly fired. The base is completely plain. The outer surface is covered with fine cord markings. Design is limited to a single pseudo-cord parallel to the rim, though the simple, horizontal strap handles might also serve an artistic purpose. The rim is rounded and slightly incurvate in cross section. Appendages are limited to 2 strap handles placed about ½ inch below the rim on opposing sides of the bowl. This vessel was found intact, though subsequent drying caused warping which produced cracks.

Vessel 2 (396910), Test 1, is a tall vase with globular lower portion, 7 inches across, and a constricted, straight neck. The vase is 10 9/16 inches high and has an oral diameter of 3 11/16 inches. The flat base is 3½ inches in diameter and is plain. The sides are ¼ inch thick and are red and buff in color both inside and out. The paste is grit tempered, poorly fired, and friable. Surface treatment is fine cord marking, though the cord markings are nearly obliterated on the lower portions of the vessel. Design consists of wide arcs incised on the upper portions of the vessel, enclosing areas within which the cord marks have been erased. Additional ornamentation

consists of a raised collar on the neck of the vase about 2 inches from the rim, with 4 strap handles pinched out of this collar. These strap handles are horizontal and are equally spaced on the 4 opposing sides of the neck. The rim is rounded and vertical in cross section. This vessel was found intact lying on its side.

Vessel 3 (396911) (Fig. 6), Test 1, is a large, grit-tempered vase with straight sides, flat bottom, and undifferentiated neck. The vase is 13⅜ inches high and was found upside down. The flat base is 3⅞ inches in diameter and is plain. The oral diameter is 10 inches, while the sides are ¼ inch thick. The paste is well fired and hard. Exterior colors are buff, brown, and sooty, while interior colors are brown and black. Surface treatment consists of fine cord marking, portions of which are obliterated inside incised scrolls superimposed on the cord marks. The rim is rounded and straight in cross section, with 3 gentle undulations or crenelations. With this vessel were found 3 celts and a chipped scraper.

Vessel 4 (396912), Test 1, is similar in shape to vessel 2, but is broken, with several essential portions missing. The oral diameter is 3½ inches while the basal diameter is 2½ inches. The walls are ¼ inch thick, poorly fired, and friable. The base shows a bamboo-mat impression, in which respect it differs from vessel 2. Colors are red on inner surface and red, buff, and black on outer. Surface treatment is fine cord marking with portions of the cord markings obliterated by rubbing of areas enclosed by incised spiral and wavy designs on the upper half of the vessel. The rim is rounded and straight in cross section, though most of the rim has spalled away due to the friability of the ware.

Vessel 5 (396913), Test 1, is a small bowl with flat bottom, and with the upper portions of the sides missing. The over-all height is in excess of 2½ inches, though the rim diameter and cross section cannot be determined. The base is plain, 2 inches in diameter. The sides are 3/32 inch thick and are gritty and friable. The bowl is buff in color on all surfaces. Surface treatment is fine cord marking with portions within the incised, curved design rubbed smooth.

Vessel 1 (396922), from Test 2, is a vase with straight sides, flat bottom and is 7 15/16 inches high. The oral diameter is 3½ inches while the basal diameter is 2⅜ inches. The side walls are ⅛ inch thick, red and black

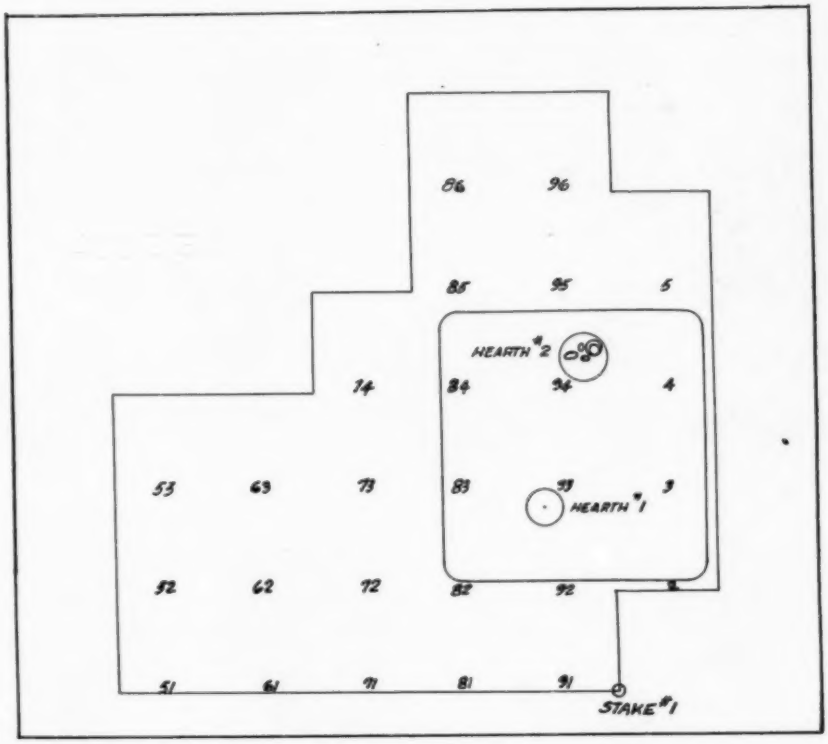

Fig. 7 Plan of Anenuma Site 2, showing area excavated. The site is staked in 5-foot squares. The hearths are in a rectangular house pit of the Haji period.

in color on exterior surfaces and buff, brown, and black on interior faces. The base is plain, while the sides are completely covered with fine cord markings, except where the cord markings had been obliterated by rubbing out the marks within curved, incised lines. The rim is rounded and excurvate in cross section.

Vessel 2 (396923), Test 2, is a grit-tempered vase with straight sides and flat bottom. The over-all height is 6⅛ inches, the sides ⅛ inch thick. The bamboo-mat-impressed base is 2 9/16 inches in diameter. The mouth of the vase is 5 3/16 inches in diameter, the rim slightly incurved, and the lip rounded. The colors are buff and black both inside and out. The entire outer surface is covered with fine cord markings with no other marks or designs.

All ceramic materials found at this site are of the Jomon pattern and appear to represent the Later Jomon subdivision, with many resemblances to the Horinouchi ware of the Tokyo area (Groot 1951: 59).

Anenuma Site 2

Anenuma Site 2 is a large site lying on the east side of the valley of the Yamagawa River, one of the streams which enters Anenuma from the south. About 2 miles north of Furumaki town a dirt road leads from the plateau on the headland down to the rice-paddy fields in the valley below. The finding of exposed sherds in the road led to an examination of the talus as well as the top of the hill at the edge of the plateau. The plateau at this point is wooded and apparently has never been cultivated. House-pit depressions are found scattered widely over the site, and 3 low heaps of earth each 30 feet in diameter and of artificial origin are found in the woods on the site.

Material preserved from the roadcut consists of sherds only, though many chips of flint, fire-cracked stones, and flecks of charcoal were noted but not collected. The pottery found

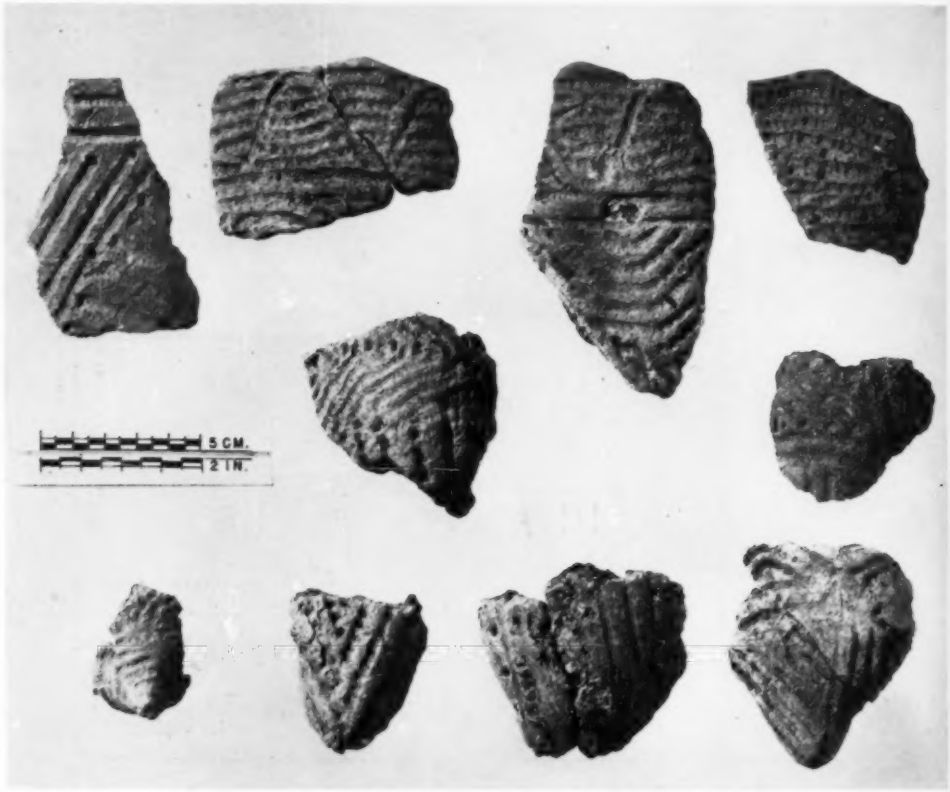

Fig. 8. Proto-Jomon sherds from Anenuma Site 2. USNM negative 41880.

consisted of 19 rims, representing 19 vessels, 3 basal sherds, and 54 body sherds. The sherds represent the Jomon period, from Proto-Jomon through Later Jomon, with the Later Jomon sherds predominating.

At a point immediately above the roadcut, it was decided to excavate a test area which would include a house-pit depression to determine the relationship between the house pit and the Jomon sherds found in the roadcut. The excavation comprised 650 square feet (Fig. 7) and was dug to undisturbed hardpan at an average depth of 30 inches. The hardpan was clay, while the topsoil was black, loamy earth. Artifacts were found throughout the topsoil with no definite stratification indicated. The house pit of the Haji period was easily defined, and all material found in the house pit was kept separate. Under and around the house pit were found Jomon sherds and flints. At first no attempt was made to keep sherds separated by depth from the general excavation, but late in the digging season, 4 5-foot squares were dug in 6-inch levels. These squares were those numbered 52, 53, 86, and 96. A tabulation of the sherds found in these squares by type and depth is shown in the following table. Only definitely identified sherds are counted. It will be noted that in one instance only was a Haji sherd found below the 1-foot level and this was above 18 inches. Also no Proto-Jomon sherds were obtained from the upper levels, while they were found at the greater depths of 18 to 30 inches. Those sherds listed as "un-

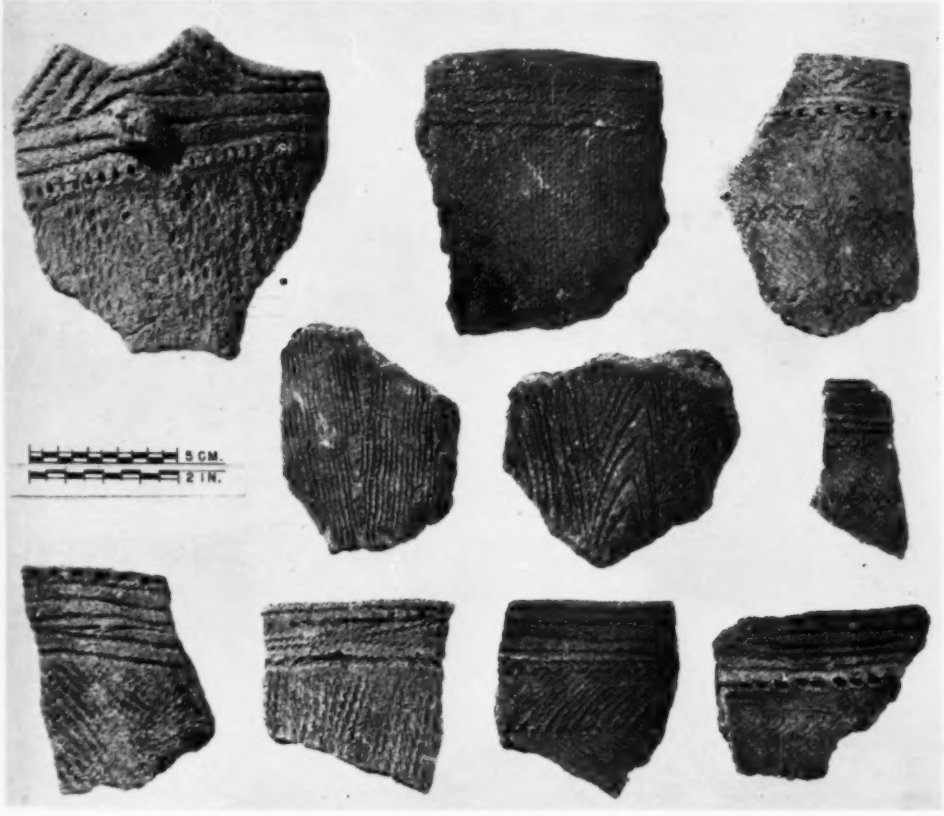

Fig. 9. Early Jomon sherds from Anenuma Site 2 and Ogawara Site 3.
USNM negative 41880-B.

classifiable" are body sherds without definite identifying characteristics, though all are cord marked, coarsely fired, and are Jomon as opposed to Haji wares.

TABLE 1. SHERDS FROM ANENUMA SITE 2, NORTHERN HONSHU

Square and Level	Proto-Jomon	Early Jomon	Middle Jomon	Later Jomon	Haji	Unclassifiable
52 L1	—	—	—	—	2	6
L2	—	3	2	—	—	11
L3	—	8	3	—	—	13
L4	6	18	2	—	—	28
L5	2	10	5	—	—	22
53 L1	—	—	—	—	4	6
L2	—	—	—	—	—	12
L3	—	4	4	—	—	7
L4	—	3	—	—	—	4
L5	—	4	—	—	—	2
86 L1	—	—	1	—	—	11
L2	—	—	—	—	—	10
L3	—	—	2	—	1	14
L4	—	1	1	—	—	6
96 L1	—	2	4	—	—	7
L2	—	5	1	—	—	18
L3	1	—	1	—	—	17
	9	58	26	—	7	194

From the general excavation, excluding the house pit, came the following artifacts:

2 broken celts
4 arrowpoints
3 "blanks" or incomplete flint artifacts
1 drill, flint (396944)
2 tanged knives

Jomon pottery sherds, as follows:

125 rims representing 101 vessels
46 basal sherds
1823 body sherds

Haji sherds, as follows:

13 rims representing 12 vessels
2 basal sherds
22 body sherds

The pottery traits revealed by the sherds recovered from the general excavation are as follows. Haji ware found is identical to that recovered in the house pit, to be described in the second article of this series. The Jomon-

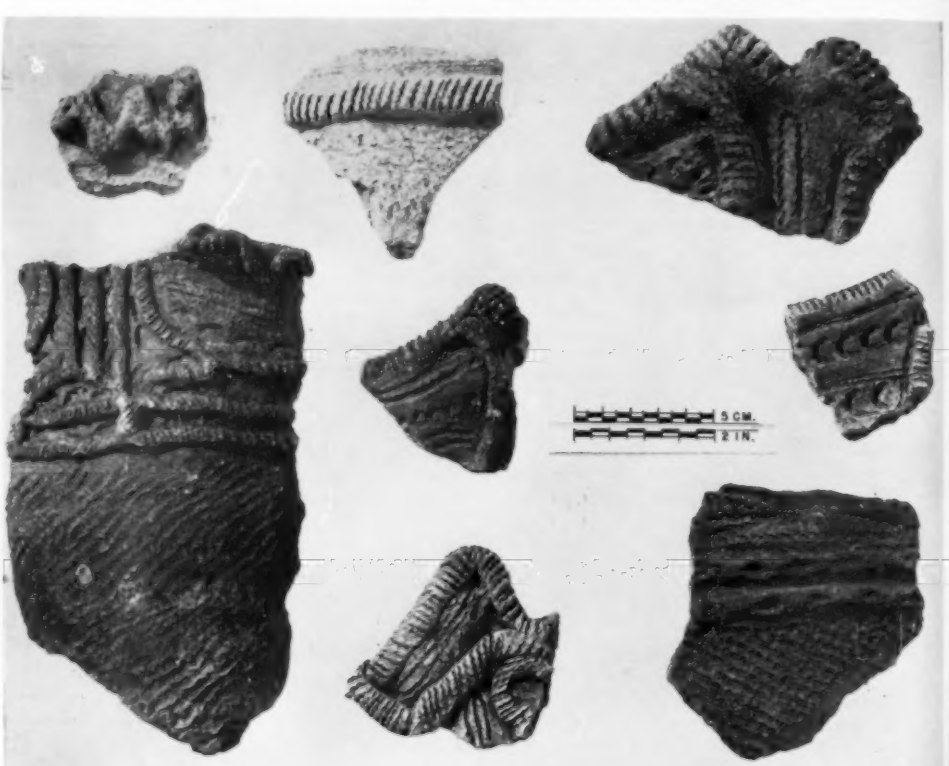

FIG. 10. Middle Jomon sherds from Anenuma Site 2. USNM negative 41880-D.

period ware can be definitely divided into 3 major groups — the Proto-Jomon, Early Jomon, and Middle Jomon.

Sherds of the Proto-Jomon (396957) reveal vessels with straight sides, undifferentiated necks and rims, and conoidal bases. No restorable vessel of this type was found, so that over-all height of the ware cannot be stated. Oral diameters range from 5 to 7 inches, while the pointed nature of the bases preclude measurement of a basal diameter. The sides of the vessels are from ⅛ to ½ inch thick, and the tempering material used is either fiber or mixed grit and fiber. Colors of the ware are yellow, buff, and gray both inside and out. Surface treatment consists entirely of pointed- or flat-stick impressions. These cover the entire body of the vessel, even down to the point of the base. This type of surface treatment is illustrated in Figure 8. The rim is either round and straight or square and straight in cross section. Gentle undulations create a wavy effect in the rim top as seen from the side, either intentional, or perhaps to be attributed to the crudeness of the ware. No appendages, sculpturings, or designs are found on these vessels. Similar pottery has been recovered at Sumiyoshi on the southern coast of Hokkaido near Hakodate.

Vessels of the Early Jomon are usually straight-sided vessels with flat bottoms (Fig. 9). The ware is usually tempered with grit, but occasionally grit and fiber are used together. Coarse or fine cord markings are found, frequently arranged in a chevron pattern. Bottoms are flat and usually plain. This ware is often referred to as "cylinderware," descriptive of its predominant shape. It is found at Korekawa and Ichioji, both in Aomori Prefecture, and also in Hokkaido.

Vessels of the Middle Jomon (396958) are either straight-sided vases with undifferentiated necks and mouths and flat bottoms or are cylindrical vessels with a slightly flaring mouth. Over-all height is unknown, since no restorable vessel of this ware was found. Oral diameters vary from 6 to 10 inches, while basal diameters range from 4 to 6 inches. Bases found are entirely plain. The side walls are from ¼ to ½ inch thick, and the tempering used is either grit or mixed grit and fiber. Colors vary from red through yellow, buff, brown, and gray to black, while a few are soot-blackened. Surface treatment is always cord marked, either fine or coarse, with the coarser types prevailing. Design consists of pseudo-cord impressions parallel to, at right angles to, or oblique to the rim, ropelike appliqué, added rim strips, and collars on the neck, with many combinations of these traits. Rims are rounded and straight, square and straight, or thickened. Many rims show pointed or rounded crenelations, a few of which are bifurcated. Rimtops are sometimes cord marked, sometimes notched, and sometimes sculptured. Examples of these types of design are shown in Figure 10. A few perforations for repair complete the list of ceramic traits revealed by the sherds recovered. This ware is found at Korekawa, Ichioji, and other sites in Northern Honshu, and at sites in Southern Hokkaido.

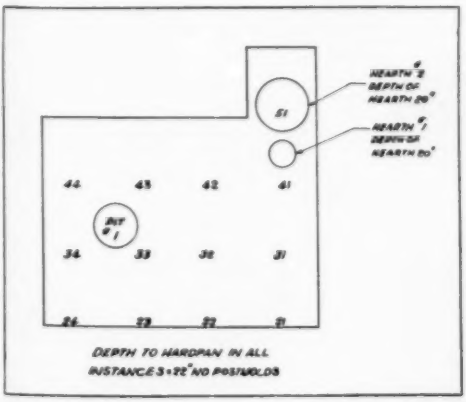

Fig. 11. Plan of Anenuma Site 3, showing area excavated. Numbered stakes are 5 feet apart. North is to the left.

Anenuma Site 3

Anenuma Site 3 is located on the west side of Lake Anenuma. The terrace here is about 50 feet above the present lake and is quite level. It is dissected by several small stream valleys and one larger one, which separates Site 3 from Site 4. Evidence of ancient occupancy of the terrace is found at every headland and at many spots not so strategically situated. Site 3 is one of the more prominent headlands. The point of land on which the excavations were made is about 100 feet wide and rapidly widens into the main part of the terrace about 300 feet from the tip. At every eroded gully and bare spot on the headland may be found potsherds and flint chips.

At the extreme tip of the point 3 test areas were excavated to hardpan at a depth of 22 inches. One test nearest the tip of the headland was designated as Site 3 and comprised 325 square feet (Fig. 11). In this area were found 2 hearths and 1 pit, plus many random artifacts. No postmolds or house pits were found. About 100 feet north of Site 3 excavation, a smaller test was made, designated 3B and comprising only 50 square feet. One hundred feet north of 3B was a larger test, designated 3A, which comprised 200 square feet. 3B yielded only potsherds, including 2 restorable bowls. 3A contained 1 hearth and many random sherds, but no other features.

In the excavation of Site 3, the 2 hearths were found at a depth of 20 inches. Hearth 1 consisted of a burned area in the clay hardpan about 2 feet in diameter. Hearth 2 was larger, 32 by 40 inches, and was partially enclosed by a wall of sandstone slabs, clay, and large potsherds. Within the hearth was burned clay and topsoil with small amounts of wood ash and charcoal. The sherds which formed part of the wall around the hearth were all from the same vessel, but are insufficient to allow restoration of the bowl. The slabs of sandstone making up a portion of the hearth wall were 2 inches thick and roughly rectangular, 6 by 11 inches. The slabs and the sherds were held upright in place by a 12 inch-high wall of clay, 6 inches thick at the bottom. This wall enclosed the western ⅓ of the hearth. No other feature was associated with the hearths.

Pit 1, Site 3, was 3½ feet in diameter and extended 1 foot into the hardpan, a depth of 32 inches from the surface. Above the hardpan the pit was not visible, and consequently the pit was not recognized until the hardpan was stripped in a search for postmolds. Material found above the 22 inch depth is therefore included in the materials of Squares 33 and 34, while the materials from the lower portion of the pit were kept separate.

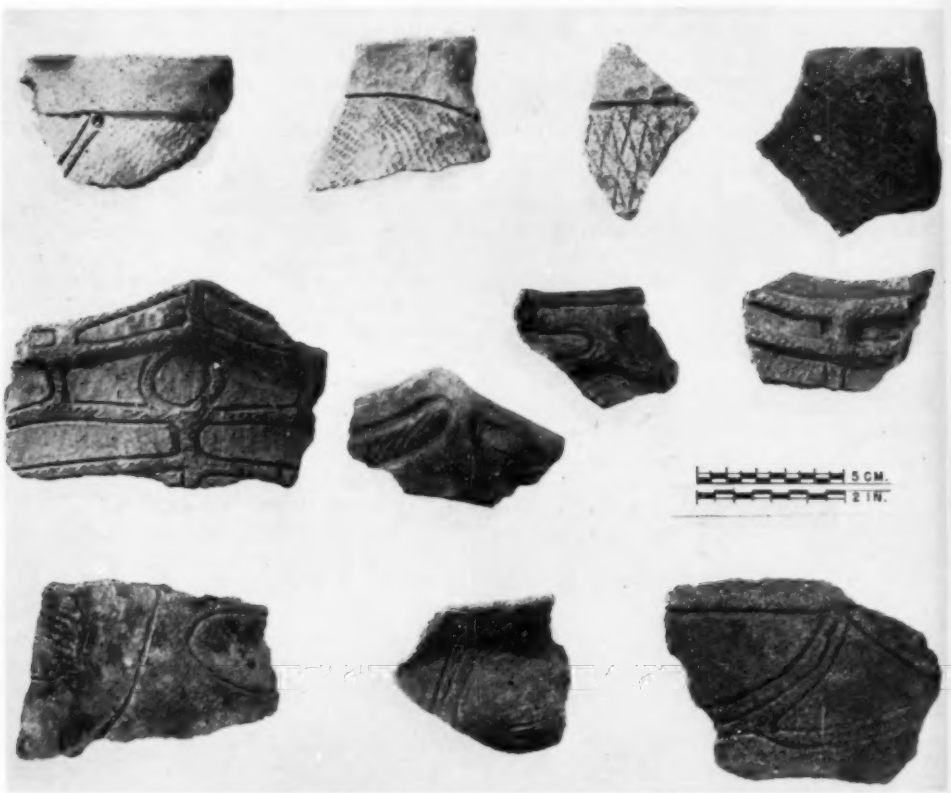

FIG. 12. Late Jomon period sherds from Anenuma Site 3. USNM negative 41879-C.

These include:

31 rim sherds representing 28 vessels
8 basal sherds
186 body sherds
1 incised and perforated clay pendant (396968)
1 clay "problematical," broken
4 projectile points
1 flint scraper or knife

The clay pendant is a circular disc 1 2/5 inches in diameter 1/5 inch thick showing an incised design of both faces. A longitudinal perforation bisects the disc, and a circular hole 2/5 inch in diameter is centered on the disc. The design incised on one face of the pendant is shown in Figure 5 *f*. The thin edge of the disc is grooved completely around the disc. Some of the incised design contains a red, vermilion-like substance.

The incised clay problematical is a small, irregular piece of baked clay 2/5 inch thick, 1½ inch long and 1¼ inch wide at the widest part. On the larger faces of the tablet are parallel incised lines running lengthwise, while along one side a similar line is incised. Nothing is found to indicate the purpose or meaning of the artifact.

Artifacts recovered from the general excavation at Site 3 are as follows:

178 rim sherds representing 142 vessels (2 of them restorable)
94 basal sherds
1320 body sherds
1 celt, broken
3 projectile points
3 chipped flint knives
1 chipped flint "hourglass," ¾ inch long possibly a "button"

Vessel 1 (396959) from Site 3 is a simple bowl 3 inches high and 6 inches in diameter at the rim. The base is 3⅛ inches in diameter and is entirely plain. The grit-tempered walls of the bowl are 3/16 inch thick and are yellow with black blotches. Surface treatment is plain except for incised lines forming oval and elliptical areas over most of the upper portion of the

Fig. 13. Later Jomon period vessels of Horinouchi type from Anenuma Site 4. USNM negative 41188.

bowl. The rim is round and straight in cross section with slight undulations resulting in 2 rounded crenelations. Two vertically perforated lug handles are on opposite sides of the bowl at the level of the rim, centered on the crenelations.

Vessel 2 (396960) from Site 3 is a vase with nearly straight sides and a flat bottom. Over-all height is 8 inches while the oral diameter is 7 inches. The plain base is 4⅛ inches in diameter. The grit-tempered walls are ¼ inch thick and are buff and gray, with some soot-blackening of the outer surface. Surface treatment was originally coarse cord markings. However, the design consisting of incised bands enclosing cord-marked areas, outside of which all cord impressions have been obliterated, results in a smooth surface over most of the vessel. An added rim strip ½ inch high strengthens and ornaments the rim. The rim is rounded and straight in cross section.

Test area 3B consisted of one 5 by 10 foot excavation dug to hardpan at a depth of 22 inches. No features such as pits or postmolds were observed. However, 2 restorable vessels were found at a depth of 14 inches, and, in addition, the following random artifacts were recovered:

5 rim sherds representing 4 vessels
33 body sherds
1 clay, platelike problematical object, fragmentary

Vessel 1 (396981), Test 3B, is a vase with slightly expanding sides, slightly constricted neck, and flaring rim. Over-all height is 5 inches and oral diameter is 5⅛ inches. The flat base, 3 inches in diameter, is plain. The grit-tempered walls are ⅛ inch thick, and gray and black both inside and out. The surface is entirely plain. The rim is square and excurvate in cross section.

Vessel 2 (396982), Test 3B, is a simple bowl 3¼ inches high with straight sides expanding from a base 3⅛ inches in diameter to an oral diameter of 5½ inches. The base is plain, as is the entire bowl. The side walls are ⅛ inch thick, buff and black. Design is composed of incised lines forming 2 bands of triangles containing parallel incised lines. The rim is round and straight in cross section.

Test area 3A was located on the immediate edge of the terrace overlooking Anenuma. The 200 square feet of topsoil removed yielded the following material:

21 rim sherds representing 21 vessels
20 basal sherds
366 body sherds
1 broken celt or chisel

One hearth was found at a depth of 22 inches from the surface at the level of the hardpan. It was roughly round, 2½ feet in diameter, and was enclosed by a wall varying from 6 to 8 inches in height composed of slabs of sandstone set on edge and imbedded in clay. The individual slabs were roughly 6 by 10 by 2 inches. A small amount of charcoal and wood ash was found in the hearth, and the subsoil was burned red under the hearth. No concentration of pottery or other cultural material was found with the hearth.

Pottery traits revealed by the miscellaneous sherds found in the 3 excavations at Anenuma Site 3 are as follows (see Fig. 12): Vessels are vases with straight sides, slightly constricted necks, and flaring rims, or are small straight-sided bowls. All vessels have flat bottoms, usually plain, though one shows an incised circle and a few show the impression of a bamboo mat. Basal diameters range from 1½ to 8 inches while oral diameters vary from 3 to 14 inches. Most sherds show grit tempering and are well fired. Body thicknesses range from 1/16 to ½ inch. Colors of the ware are red, yellow, buff, brown, gray, and black, while a few show soot-blackening. Surface treatment consists of fine or coarse cord impressions over the entire surface, though on a few sherds the cord marks have been rubbed smooth. Rarely a coarse net of large diamond mesh was impressed over the cord markings. Decoration consists of incised designs within which the cord impressions have been obliterated, incising on plain, added rim strips, added collars on necks of vessels, vertical or horizontal strap handles incorporated with other motifs, and occasional punctates, either alone or in conjunction with incised designs. Rims show considerable variety in cross section and treatment. Most common is the rounded, either straight or excurvate, though the square and excurvate is also not rare. Some rims are thickened, and a few are pointed and flaring. Rims are usually parallel to the bases though a few show undulations of up to one inch over the general level of the rim. Some rim tops are grooved, others are cord marked, while most are plain. A few examples found show "pseudo-cord" impressions on the inner surface of the rim. Appendages found are lug handles, strap handles 2 inches long and ¾ inch wide, and perforated knobs, with a few rims perforated for suspension also present. The ware seems to be attributable entirely to the Later Jomon period.

Anenuma Site 4

This site occupies the eastern end of a long finger-like peninsula which protrudes into the lake from the west. The peninsula is about 100 feet high and ¼ mile wide at its base but quickly narrows down to 200 yards and a height of about 50 feet nearly ½ mile from its eastern extremity. The eastern end of the

peninsula is walled off at a distance of 250 feet from the tip. The fortification consists of 2 parallel walls averaging 40 feet apart enclosing a ditch, the bottom of which is now about 2 feet below the natural surface. Since the walls average 3 feet in height above the natural surface, the resulting relief at the wall is about 5 feet. Within the area enclosed by the wall are 32 pit-house depressions, while at least 24 more are scattered about the peninsula outside the wall. These are roughly circular and vary from 15 to 30 feet in diameter and from 9 to 30 inches in depth. A small Shintoist shrine with two *torii* (gates) is located within the wall, though this is not of great age, having been moved to this location from Anenuma Site 1 in 1946. The house pits and wall belong to the Ogawara Pit-house culture, and the excavation of 2 of the houses will be described in the second paper of this series.

The sides and end of the peninsula are steep, and undoubtedly this easily-defended position influenced the aborigines to settle here. One small area at the eastern end of the site was slightly eroded, exposing sherds, fire-cracked stones, and a small circular pit. The pit was 26 inches in diameter, 24 inches deep, U-shaped in cross section, and devoid of artifacts. The sherds exposed on the surface of the eroded area represented the Later Jomon period and led the writer to excavate a test area 10 by 20 feet. This area yielded 2 large Later Jomon vessels which had been buried on their sides at a depth of 14 inches. Both were crushed, with small pieces missing, but are restorable. Also found with these 2 vessels was a small cup, reminiscent of the present-day sake cup.

Vessel 1 (396987) (Fig. 13 *a*) is a grit-tempered, flat-bottomed vase, with slightly constricted neck and flaring lip. Over-all height is 13⅜ inches, oral diameter 10½ inches, and the plain base 4½ inches in diameter. Walls of the vase are ⅜ inch thick and are red, yellow, and buff in color both inside and out. The surface treatment is a coarse cord marking, but nicely applied so that the appearance is pleasing. Design consists of bold, sweeping incised arcs, circles, and lines parallel to the rim covering the upper half of the vessel. The incised lines had been made with a round, blunt implement, and the impressions are uniform in width and depth. The rim is square and vertical in cross section and bears 8 crenelations equally spaced around the rim, with alternate crenelations bifurcated.

Vessel 2 (396986) is a small, perfect cup, made from grit-tempered clay. The cup is 1 inch in height, basal diameter ¾ inch, oral diameter 1⅝ inch. It has vertical sides near the base, but the sides flare rapidly outward about halfway from the base to the rim. The rim is rounded and flaring in cross section. The base is completely plain, as is the entire vessel. Colors are yellow and buff on all surfaces.

Vessel 3 (396984) (Fig. 13 *b*) is a large vase almost identical to vessel 1, and found lying beside it at the same depth, separated by about 10 inches of black earth, which contained vessel 2. Several pieces of vessel 3 were missing, but complete restoration was possible. Over-all height is 13½ inches, oral diameter 10 5/16 inches, and basal diameter 4⅜ inches. The base is plain, and the color of the entire vessel is red, yellow, and buff. The surface treatment and designs are almost identical to those of vessel 1, but 3 is slightly more friable, and therefore less well preserved. It appears possible from the size, shape, and design that the same potter made both vessels.

Miscellaneous sherds from the test square are of both the Jomon and the Haji types. The Jomon types consist of 10 rims representing 10 vessels, 96 body sherds, and 13 basal sherds. The traits revealed by these sherds are as follows. Vessels are straight sided, flat bottomed, and grit tempered. Bases are all plain and vary in diameter from 2¾ to 5 inches, while oral diameters vary from 4 to 14 inches. Sidewall thicknesses range from ⅛ to ½ inch and surfaces are red, yellow, buff, brown, gray, black, or soot covered. Surface treatment shows both fine and coarse cord marking, with the coarser predominating. Design is generally sculptured in appearance and consists of incised lines over the cord marking, with the cord marks rubbed out in many cases. One instance of a doughnut-shaped button is found, while a few vessels have a thickened collar on the rim. Generally the rims are vertical and square in cross section, and many are crenelated. This ware seems to represent the Later Jomon period, but may be a local variant of the Kamegaoka ware of the Final Jomon (Groot 1951: 64).

Anenuma Site 5

Site 5 lies on a steep slope overlooking the outlet of Lake Anenuma immediately south of the road leading west from Misawa Air Force Base. Erosion has washed away much of the site, but sufficient remains are found to indicate Jomon occupancy. On the eroded slope about 60 feet above present lake level are found flint chips, projectile points, fire-cracked stones, and hundreds of cord-marked sherds. In the roadcut 2 pits were exposed which contained only black earth, with traces of wood ash. They were 32 inches in diameter, 3 feet deep from the surface and had straight sides with rounded bottoms. Their use or origin is uncertain.

A 10-foot test square excavated in the eroded area yielded most of the sherds of an Early Jomon vase over 11 inches high, 6½ inches in

diameter at the top, with a flat bottom 2½ inches in diameter. This incomplete vessel is now in the City Museum of Augusta, Georgia. Other sherds (396999) representing at least 9 vessels were found. These vessels were of the same type as the incomplete vessel found, straight-sided, flat-bottomed vases. Rim diameters vary from 5 to 12 inches with basal diameters from 2½ to 4 inches. All the vessels are grit tempered and are covered with fine or coarse cord markings. Interior and exterior surfaces of sherds range in color from yellow through brown to black. No appendages were found, though the incomplete vessel has an added rim-strip embellishment.

Projectile points are either triangular, or slender with a pointed tang. No polished implements were found, and no trace was found of house pits, postmolds, or hearths.

Anenuma Site 6A

Immediately west of the fortified Haji village, Site 6, is a portion of the terrace on which no house pits were observed. However, in a roadcut for the road which descends from the terrace to the rice-paddy field in the valley below, many Jomon-period sherds and pits containing clamshells were exposed. Several pits and outcrops of this refuse were troweled through, and many sherds were found, including enough of 3 vessels to enable us to restore them. On the level terrace just above the roadcut a test square 5 by 5 feet was excavated, but the paucity of cultural material at this point discouraged further digging. All the material found in the roadcut and in the test square was of the same type, so that it is here treated as one.

The material collected consisted of the following:

5 rim sherds representing 5 vessels in addition to the 3 restorable vessels
8 basal sherds
77 body sherds

Vessel 1 (396997) (Fig. 14) found in the roadcut at Site 6A is a vase with straight sides and rim and flat bottom. The over-all height is 20 inches, the oral diameter 14 inches. The base is 5¼ inches in diameter and is plain. The sides are ½ inch thick and color is yellow, buff, and black on exterior surfaces and buff and gray on the inside. Surface treatment is coarse cord marking over the entire surface. No design is present. The rim is round and straight in cross section.

Vessel 2 found in the roadcut is a vase with flat bottom, flaring sides, slightly constricted neck, and an everted rim. The paste is grit tempered and the surface is brown and black in color, both inside and out. Some soot encrusting is present. Over-all height is 6¼ inches and the oral diameter is 4½ inches. The base is plain and is 1¾ inches in diameter. Side walls are 3/16 inches thick. The outer surface is completely covered with fine cord impressions, and no design is present. The rim is rounded in cross section.

Vessel 3 found in the roadcut is a straight-sided vase 15 inches high. The base is flat, 3¾ inches in diameter and is covered with bamboo-mat impressions. The oral diameter of the vase is 10 inches. Side walls are ¼ inch thick and are grit tempered. The exterior is cord marked, except for the upper 2 inches below the rim, which is plain. Design consists of "pseudo-cord" lines enclosing rectangular areas on which the cord impressions have been rubbed smooth. A strip of clay added at the shoulder of the vase is notched with a cord-wrapped stick. A double line of "pseudo-cord" impressions parallel the rim, which is gently crenelated at a minimum of 2 points. Halfway from the rim to the base and centered on the crenelations are nodes of undecorated clay. The rim is slightly everted and the rim top is rounded. The ceramic technics exhibited in this vase are typical of the Later Jomon period.

Fig. 14. Jomon vessel from Anenuma Site 6A. USNM negative 41877.

The random sherds recovered show the following traits. Vessels are straight-sided vases with undifferentiated necks, or with slightly constricted necks and flaring rims. All bottoms are flat, and those found are 4½ inches in diameter, and plain. The oral diameter of the sherds found is 8 inches. Thickness of the sherds varies from ⅛ to ¼ inch, and all sherds are grit tempered. Surface treatment is coarse and fine cord markings, with a large percentage of sherds showing the impression of a coarse net over the cord markings. A few sherds show complete erasure of the cord impressions. Colors of the sherds range through yellow, buff, brown and black, with occasional sherds soot-blackened on outer surfaces. Design is limited to erasure of cord impressions within incised scrolls and curves. A few of the plain-surfaced sherds show simple incised lines on the upper portions of the vessels. Rims are round and straight in cross section, square and excurvate, and a few show gentle undulations which result in slightly rounded castellations. No appendages were observed on ware from this site.

Anenuma Site 7

Site 7 is located in the village of Komasawa, immediately west of Misawa Air Force Base. The village site is under cultivation yearly, therefore no excavation was attempted. However, the site was visited 3 times, and surface collections were made in the field and in the banks of a road cut through the site. The occupied area, of the Early Jomon period, seems to have been about 1 acre, centering on the top of a small natural hillock surrounded by marshy lowlands. The height of the hillock above the present level of Anenuma is about 20 feet.

Surface indications of Neolithic occupancy were plentiful. The ground was littered with potsherds, some 6 inches across, with many chips, fire-cracked stones, and occasional stone artifacts. No bone or shell refuse was present. The collections made were limited to the following:

1 cup (vessel 2)
2 restorable vessels (1 and 3)
1 fragmentary bowl (4)
16 rim sherds representing 13 vessels
1 basal sherd
1 broken celt
5 flint projectile points

Vessel 1, found in the roadcut at Anenuma Site 7 is a cylindrical vase 10¾ inches high, with an oral diameter of 6 inches. The aplastic used in the clay is grit, with angular pieces of vermilion protruding from the surface. The base is plain and is 3½ inches in diameter. The side walls are 5/16 inch thick and are red, yellow, and buff in color. Surface treatment is indistinct due to weathering, but impressions made by rolling a cord-wrapped stick can be recognized. The rim is slightly everted, round in cross section and is notched with cord impressions.

Vessel 2 is a small, complete cup modeled from a single lump of clay. The height is 1½ inches, the oral diameter 2 inches. The base is flat, plain, and 1½ inches in diameter. The clay is untempered except for pieces of vermilion which protrude from the surface. The ware is red, and is entirely plain. Side walls are straight, and the rim top rounded.

Vessel 3 is a cylindrical vase with slightly flaring rim. The over-all height is 14 inches, the oral diameter 12 inches. The base is flat, plain, and 4 inches in diameter. The clay is grit tempered and is red and brown in color. Side walls are ⅜ inch thick. Surface treatment consists of coarse cord marking. Design is limited to a band 2½ inches wide parallel to, and immediately below, the rim, filled with horizontal "pseudo-cord" impressions. The rim is notched with a cord-wrapped stick, and bears 3, low, rounded crenelations. No appendages are present.

Vessel 4 comprises the base and lower portions of a straight-sided vase, and might possibly have been used as a bowl after the loss of the upper portions of the vase. The remaining portion is 3 inches in height and has an oral diameter of 6 inches. The base is plain and is 4½ inches in diameter. The ware is fiber tempered and is weathered considerably, though some traces of the coarse cord impressions still remain. No design is present, nor is there any identifiable rim.

The pottery traits revealed by the miscellaneous sherds collected are as follows. Vessels are straight-sided vases ending in either a flaring or straight rim. The base recovered is 4½ inches in diameter and is plain. Oral diameters are from 4 to 10 inches. The aplastic used is primarily grit, though mixed grit and fiber tempering is found. Side walls are from ¼ to ½ inch in thickness and colors are red, yellow, brown, gray, and black. Surface treatment is fine or coarse cord marking, with the coarser predominating. Designs are limited to pseudo-cord impressions parallel to, at right angles to, or oblique to the rim. One added rim strip, embellished by pinching between the finger tips, is present. The rims are usually straight and either round or square in cross section. One rim showing a pointed crenelation was found. In some instances the rim top is cord marked, and one rim was given a sculptured effect by adding lumps of clay, and then indenting the lumps with a cord-wrapped malleating tool. No appendages were found. The sherds found indicate occupancy of the site during the Early Jomon period.

Anenuma Site 8

Anenuma Site 8 is located on a wooded headland in the valley south of Anenuma and lies just opposite Anenuma Site 2. The site was visited only once and no excavations were undertaken. Eroded gullies and a roadcut showed numerous sherds of the Later Jomon period such as had been found so plentifully

at other sites in the area. No collections were made, as it was intended to revisit the site for that purpose at a later time. However the relative inaccessibility of the site from Misawa Air Force Base prevented carrying out that intention.

Anenuma Site 9

Anenuma Site 9 is likewise difficult to reach from Misawa Air Force Base, since it lies on the opposite side of Anenuma from the Base, and no road leads to the wooded headland on which the site is located. The site was reached by walking along the railroad track (Tohoku Main Line) from its tunnel through the headland near Anenuma Site 2. Site 9 is located on the point of land formed by the junction of the 2 creek valleys which unite to form the main valley of Anenuma. Evidence of ancient occupancy is scattered over about 5 acres, most of which is wooded. A narrow farm trail leads through the site, and in the drainage ditch along the trail approximately 18 inches of refuse-filled topsoil were disclosed. No bone, shell, or other organic material was noted. In addition to Later Jomon pottery, a few sherds of the Haji period were noted, and several typical Haji house-pit depressions were observed in the area, both on Site 9 and along the edge of the terrace between it and Site 8. No collections were made at this site.

Anenuma Site 10

Site 10 is located on a rolling plateau 75 feet high overlooking the southern end of Anenuma. It is located immediately south of the Tohoku main railroad line on the western side of the Yamagawa Valley. The site is under cultivation but appears to have been cleared of its forest cover only recently. The sandy topsoil is of a fairly uniform thickness of 16 inches, and is interlaced with many decaying roots.

Surface indications existed in the form of stone and clay artifacts, and in 2 places, shallow, saucer-shaped depressions, typical of Haji-period pit dwellings. Surface artifacts consisted of plentiful potsherds of both the Jomon and Haji periods, flint chips, fire-cracked stones, and an occasional stone implement. Jomon-period sherds, representing Later Jomon, predominated. A 10-foot test square excavated near the bluff edge yielded the following:

29 rim sherds representing 20 vessels
453 body sherds
1 blade end of a celt, of light-colored granite (397021)
1 flint "thumb" scraper
1 rude stemmed flint projectile point
1 whetstone, of fine grained pumice

All of the vessels are cord marked, with slightly flaring rims, some of which bear an added rim strip, also cord marked. Pointed crenelations are present on at least 4 vessels. One small, perforated lug is the only appendage of that nature found. Bottoms of the vessels are flat, though one consists of a pedestal (397022) 2⅜ inches in diameter narrowing to a neck of 1½ inches which supported the main part of the vessel. Most of the basal sherds show impressions typical of simple bamboo-splint weaving. All of the sherds are grit tempered, some to such an extent that the ware is easily crumbled between the fingers. The color of the ware ranges from cream through red to brown. Traces of smoke-blackening are present on some sherds.

Anenuma Site 11

Site 11 is located on the east bank of Anenuma on a terrace about 75 feet above lake level. The site is on the north side of a deep valley at its juncture with the lake shore. The valley lies halfway between Sites 6 and 5, and is entirely covered with dense underbrush and trees. No excavations were undertaken on the surface of the site proper due to this obstacle. However, at the foot of the terrace below the site, a roadcut disclosed many sherds, chips of flint and obsidian, and fire-cracked stones. This area was searched several times, and several spots in the talus of the terrace were troweled through. Surface collections made at this site include 1 celt (397031) (Fig. 5 *e*), 2 retouched flake knives, 46 rimsherds representing 26 vessels, 6 basal sherds, 165 body sherds, and 3 vessels, 1 of which was intact and the other 2 crushed and fragmentary, but restorable.

One 5-foot test square was dug at the edge of the plateau. The topsoil (Layer 1) was found to be 16 inches thick and densely interlaced with roots which made digging difficult. In the topsoil were many sherds, including 4 which seem to belong to the Kamegaoka type (Final Jomon). Also in this layer were 2 tanged flint knives, 1 triangular flint arrowpoint, 4 retouched flakes (probably scrapers), and a finely-chipped, thin blade 4½ inches long and less than 1 inch wide. Layer 2 was 6 inches of black soil containing many sherds of the Final Jomon and the following stone implements: 1 tanged flint knife, 6 triangular flint arrow-

points, and 7 retouched flakes. Layer 3 was 6 inches of black soil, but also contained a part of a layer of shell midden. These shells were of marine origin and enclosed almost no dirt, sherds, artifacts or other foreign matter in the layer. The layer of shells was about 4 inches thick and extended into an adjacent square which was not excavated. In the black-soil portion of Layer 3 were many sherds of Final Jomon, 2 triangular flint arrowpoints, and 1 crude sandstone "chopper." Layer 4, also 6 inches of black soil, contained only 1 tanged flint sickle-shaped knife, and a few sherds, among which was 1 pointed-base sherd of Proto-Jomon affiliation. Layer 5 was black soil, blending into brown clay-loam subsoil. This layer contained only a few sherds, including a Proto-Jomon pointed base. No cultural feature other than the shell layer was noted in the square. Total depth from surface to hardpan was 42 inches.

Vessel 1 (397033) is a straight-sided vase with flat bottom. Over-all height of the pot is 14½ inches, and oral diameter is 14¼ inches. The base is 3¾ inches in diameter and is plain. The paste is grit tempered and side walls are ⅛ inch thick. Colors are yellow, buff, gray, and black both inside and out. Surface treatment consists of fine cord marking, with no designs. The rim is rounded and straight in cross section.

Fig. 15. Vessel from Anenuma Site 11. USNM negative 41878.

Vessel 2 (397025) (Fig. 15) is a small, grit-tempered vase with constricted neck, flaring lip, and flat bottom. The height is 3¼ inches and the oral diameter 1½ inches. The plain base is also 1½ inches in diameter. Side walls are 3/16 inch thick, and colors are red and gray on exterior surfaces with buff and gray on interior surfaces. Surface treatment is fine cord marking, and designs include 4 incised lines parallel to the rim. Rectanguloid punctations fill the space between the 3rd and 4th incised line from the top, while a similar line of punctations lies below the 4th line. The rim is square and straight in cross section with a narrow groove incised into the rim top.

Vessel 3 is a grit-tempered vase with constricted neck, everted lips, flat bottom, and smooth surface from which original cord impressions have been rubbed out completely. The vase is 5¼ inches high and 5½ inches in diameter across the top. The base is faintly striated and is 2 inches in diameter. Side walls are ⅛ inch thick and are yellow, gray, and black on outer surfaces, with yellow and black inner surfaces. Design consists of incised lines scratched into the smooth surface before firing. The rim is rounded and excurvate in cross section. Equally spaced around the rim are 6 rounded eminences or castelations.

Miscellaneous sherds recovered in the test square and on the surface show oral diameters from 8 to 11 inches, while the few bases found are from 2 to 5 inches in diameter. All sherds are grit tempered and vary in thickness from ⅛ to ⅜ inch. Sherds are of all colors and many are soot-blackened. Bases are plain, cord marked, or striated. Surface treatment ranges from plain through fine to rough cord impressions. Some sherds show netlike impressions superimposed over the cord markings, while others show cord markings rubbed out on most of the surface. Designs include incised over cord, punctate, pseudo-cord parallel to the rim, incised on plain, distinct collars on the neck below the rim, and a pseudo-net impression made by incising with a pointed instrument. Rims show wide variations, including round and straight, round and excurvate, pointed or bifurcated crenelations, square and straight, square and excurvate, thickened rims, rim decorated with pseudo-cord on inner surfaces, rim top punctate, and rim top notched. Perforations for repair are noted in a few sherds.

The celt found had been broken slightly, but still shows the following dimensions: length 4¼ inches, width at blade 2½ inches, width at midpoint 2 inches, and thickness at midpoint 1¼ inches. The poll and the blade are slightly battered. Material is a tough greenish-gray traprock.

Ogawara Site 1

Ogawara Site 1 is located at about the midpoint of the east side of Ogawara Numa near the village of Yamanaka. The Sambongi Plain at this point is roughly 60 feet above lake level, and is largely wooded. At the tip of a small

headland just west of Yamanaka is a small cleared farm. At the edge of the cultivated field near the edge of the bluff overlooking the lake is Site 1. The site covers less than 1 acre, and surface indications are limited to minute Jomon sherds. At the bluff edge erosion has exposed a cross section of the topsoil at the village site. Jomon sherds were found throughout the top 30 inches, while at a depth of 30 inches were a few poorly preserved oyster shells. No bones were found, nor any artifacts other than sherds. The sherds recovered (397035) were as follows:

23 rim sherds representing 11 vessels
1 basal sherd
92 body sherds

Vessels are cylindrical with either straight or flaring rims. The base recovered is 1 inch in diameter, but other sherds indicate that larger bases must exist. Oral diameters vary from 5 to 10 inches, while sherds are from ⅛ to ⅝ inch thick. Tempering materials are grit, fiber, and mixed grit and fiber. The base is incised on the low[illegible]e. Colors of sherds are red, yellow, buff, [illegible] and black. Surface treatment is coarse and fine cord impressions, with the coarser predominating. Design is limited to incising over the cord markings. Rims are straight, either rounded or square in cross section, or rounded and excurvate. A few rims are either cord marked or punctate on the upper surfaces. Two sherds have perforations for repair of cracks. The sherds indicate occupancy of the site during the Early Jomon period.

Ogawara Site 3

Jomon-period sherds (397036) exposed in a gully on the ravine slope near the center of this Haji period village site led to the making of a test excavation. An area 10 by 5 feet was excavated to a depth of 36 inches to hardpan (clay in this instance). Sherds and chips were profuse in the top 24 inches with occasional concentrations at 12 inches. No trace was found of pits, hearths, or other cultural features. Artifacts recovered consist of:

122 rim sherds representing 45 vessels
776 body sherds
94 basal sherds representing 37 vessels
1 tanged flint knife

All of the vessels are straight-sided, flat-bottomed vases. In the majority, the paste is grit tempered, though some show both grit and fiber temper. Diameters of mouths vary from 3 to 11 inches, and bases from 3 to 6 inches. All basal sherds found are plain, without cord or bamboo-mat markings. Thickness of vessel walls ranges from 1/16 to ½ inch, with the thicker sherds predominating. Colors range from red through yellow and brown to black both inside and out. Rims vary in cross section. Some are rounded and vertical, some round and excurvate, others are square and vertical. A few are crenelated, though most are not so decorated. Most rim tops are plain, though a few are punctate and others cord marked. Surface treatment shows the following designs: punctate line parallel to the rim; pseudo-cord impressions parallel to the rim, or occasionally at right angles or oblique; incised line parallel to the rim.

Cord marking is predominantly fine, arranged pinnately, and frequently combined with impressions made by the edge of a shell superimposed (see Fig. 9, upper right). The cord marking is applied alternately to the left and right, making a chevron pattern around the sides of the vessel (Fig. 9). The above patterns, accompanied by fiber temper and simplicity of form of the vessel indicate that the ware dates from the Early Jomon period.

Ogawara Site 4

Ogawara Site 4 is located at the west end of the southern portion of Lake Ogawara. The site lies on the south side of the valley of the Shichinohe River, just above its confluence with the lake. The terrace here is about 50 feet above the lake level and is under cultivation. Scattered over about 10 acres may be found sherds, chips, and an occasional artifact other than sherds. No excavations were undertaken at this site, but on 2 occasions, surface collections were made. The material recovered is as follows:

flint chips
one half of a clay "spindle-whorl" (397083) (Fig. 5 *a*)
sherds of Sue type
sherds of Haji type, including some which show striations from potter's wheel
1 sherd from Early Jomon
many sherds from Later Jomon

The spindle whorl is .7 inch thick, roughly circular, and shows a center perforation .3 inch in diameter. The spindle whorl is 1.9 inches in diameter at its wider side, but only 1.6 inches in diameter at the narrower side, representing therefore a truncated cone. It is made of a dense, untempered clay, well baked, and gray in color.

Ogawara Site 6

Ogawara Site 6 is located on the north side (left bank) of the Sunadoji River, which flows into Lake Ogawara near the village of Ogawara. The site is about 1 mile from the mouth of the river, and is on a terrace about 40 feet above present lake level. The site is under cultivation. Surface indications are found over about 5 acres in varying densities. No excavation was undertaken, but surface collections were made on 2 occasions. Artifacts found include 2 flint scrapers (397085-6), fragments of clay tubes used in iron smelting, and many sherds of Jomon and Haji affiliation.

Summary

It appears from the foregoing descriptions that Jomon-period settlements occupied almost every desirable site on the shores of Lake Anenuma and many on Lake Ogawara. It is probable that the lakes were estuaries during the Jomon period, though this has not been definitely established. In the area of the lakes, material is found representing the whole of the Jomon period, or roughly a span of 3000 years. Material from the Final Jomon (Groot 1951) while plentiful at Korekawa, near Hachinohe, and at many sites along Mutsu Bay is scarce in the sites investigated by the author. Those traces found seem to be mixed with material from the Ogawara Pit-house culture, to be described in the next paper of this series, and may be contemporaneous. If this contemporaneity is confirmed, the Jomon period in Aomori Prefecture did not end until about A.D. 500 or after the beginning of Japanese history in southern Japan. This is an intriguing question and one which merits considerable future study. The scarcity of shellheaps in the area makes difficult the finding of cultural remains of bone, shell, or antler, or the finding of skeletal remains of the people. This produces an unfortunate unbalance in the artifact remains which have survived, and requires excessive dependence on ceramic traits to provide classifiable data.

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ALASKAN POTTERY: A CLASSIFICATION AND HISTORICAL RECONSTRUCTION

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ALASKAN POTTERY has received for the most part somewhat cursory treatment in archaeological reports, and consequently it is often difficult to obtain from published studies data on such basic characteristics as temper, paste, and in some cases, design. Outstanding exceptions to this general tendency are the works of Collins (1937) and de Laguna (1939, 1940, 1947). De Laguna, especially, not only has thoroughly reported upon excavated material but has published information on pottery from many museum collections. Since the publication of de Laguna's penetrating analyses, there have been numerous site reports in which new pottery types were added and old ones partially clarified (Larsen and Rainey 1948; Heizer 1949; Giddings 1949, 1952; Oswalt 1952a, 1953a, b, c; Griffin 1953). A systematic approach to Alaskan pottery is needed now to arrange the chronological and geographical positions of various styles and facilitate reference to specific types. A step toward a system of classification was taken by Griffin (1953: 40-2) in his preliminary treatment of pottery found at Cape Denbigh, and it is the writer's intention to enlarge upon this scheme to include all reasonably well-defined Alaskan ceramic styles.

The writer wishes to thank J. L. Giddings, Jr., J. B. Griffin, H. Larsen, and J. Van Stone for their many helpful comments on this study and the latter three for their kind permission to draw upon previously unpublished data.

Willey's classification system (1949: 5-7) for Florida pottery has been employed with some modifications. The unit of grouping — a type — is based upon surface finish or a stylistic range of decoration, which is sometimes but not invariably associated with a vessel form or temper qualities. In this study there has been no over-all consideration of those ceramic types which are undecorated or do not have a unique surface finish since the data relative to them are thus far seemingly inconclusive. The type names have been derived from the name of the geographical area where the form dominates or from which it was first reported plus a noun or nouns, which are sometimes modified, describing briefly the outstanding feature.

St. Lawrence Corrugated (Figs. 16, *10, 11*; 17, *1, 12*)

Description: Collins 1937.

Ware Characteristics: *Method of manufacture*: molded from large piece of clay except for 1 sherd which gives evidence of coiling. *Temper*: coarse sand and gravel or fine grass, the latter used alone and disappearing entirely during the Early Punuk period. *Paste texture and color*: coarse and crumbly; black. *Surface texture and color*: surfaces smoothed but not with great care; usually black, but rarely 1 or both surfaces light buff or gray with core black; this type very little fired. *Thickness*: averaging 1 to 1.5 cm. with thinnest 0.5 cm. and thickest 2.7 cm.

Decoration: *Technic*: slightly concave surface of grooved wooden or bone paddle applied to moist clay; application perpendicular, oblique, or parallel to rim, with 1 series of grooves superimposed on another in rare instances. *Design*: corrugations from approximately 3 to 6 mm. wide, with separating lands as much as 1.8 mm. *Distribution*: no large decorated sherds reported, and therefore not known how much of vessel covered; plain sherds from vessels not completely corrugated would necessarily be classed as St. Lawrence Plain.

Form: *Total vessel*: cylindrical vessels with heavy rounded, or rarely flat, bottoms, and thin walls; some sherds apparently with suspension or mending holes. *Rim*: vertical. *Lip*: rounded. *Base*: rounded or disc shaped.

Geographical Range: St. Lawrence Island, one of the Punuk Islands, probably the adjacent Siberian mainland and Seward Peninsula, and Kotzebue in houses dating later than A.D. 1450.

Associated Types: Nunivak Check Stamped and St. Lawrence Plain. There is a molded human figure on an Old Bering Sea pottery lamp in association with this type (Collins 1937, Pl. 58, *14*) as well as a molded human figure of uncertain age from St. Lawrence Island (Oswalt 1953b, Pl. 1, 5), which would seem to indicate a molded clay figurine tradition.

Chronological Position: frequent during Old Bering Sea (wood from an Old Bering Sea I house dates approximately 300 B.C. by radiocarbon method), occasionally in Early Punuk and rarely as late as historic contact.

Relationship: unknown.

References: Collins 1937: 168-9, 238-9, 341-2; Geist and Rainey 1936: 223; Johnson 1951: 15; de Laguna 1947: 226-58; Oswalt 1953b: 5-18; Rainey 1941: 550; Van Stone, personal communication; University of Alaska collections.

St. Lawrence Plain (Fig. 17, *1, 2, 12*)

Description: Collins 1937.

Ware Characteristics: same as those of St. Lawrence Corrugated.

Decoration: absent.

Form: *Total vessel*: cylindrical with heavy rounded or flat bottom and thin walls; some sherds with suspension or mending holes. During the Late Punuk period a flat-bottomed rectangular vessel form with pierced outside-corner suspension lugs was introduced. During some unknown period the vessel form with a disc-shaped bottom and slightly flaring sides was introduced. *Rim*: vertical. *Lip*: rounded or flattened. *Base*: rounded or disc-shaped on early vessels, flat and rectangular on Late Punuk and more recent.

Geographical Range: St. Lawrence Island, one of the Punuk Islands, and rarely at many recent Seward Peninsula sites.

Associated Types: St. Lawrence Corrugated, Nunivak Check Stamped, and rarely Seward Striated, Yukon Lined, Deering Pyramid Paddled, a cord-marked type, and molded clay figure in human form.

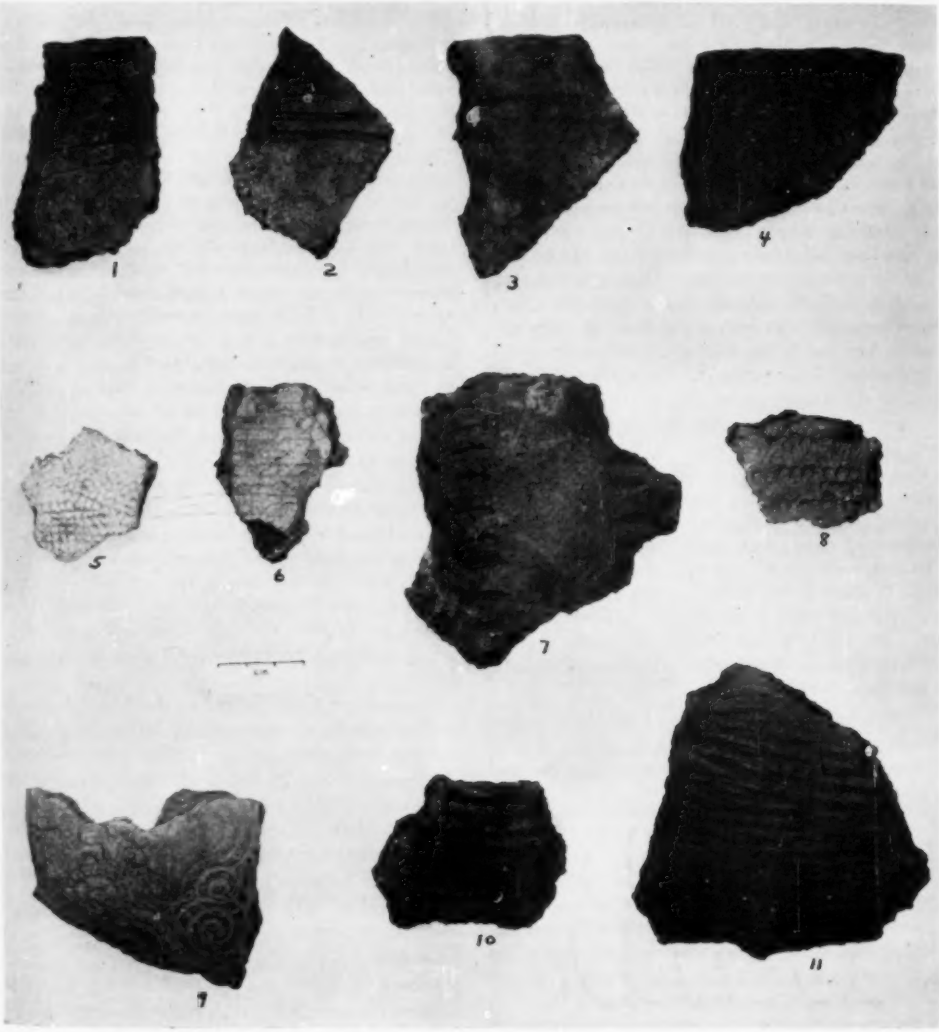

FIG. 16. Sherds from Alaska illustrating various forms of surface treatment.

Chronological Position: a dominant type from Old Bering Sea times to historic contact on St. Lawrence Island and occasionally on Seward Peninsula in recent sites.

Relationship: unknown.

References: Collins 1937: 168-9, 238-9; Oswalt 1953b: 5-18.

Norton Linear Stamped (Fig. 17, *3, 8, 12*)

Description: Griffin 1953 (preliminary statement).

Ware Characteristics: *Method of manufacture*: possibly coiling. *Temper*: sand and small rock particles. *Paste texture and color*: sherds tending to spall, possibly with frost action, and break off in layers; paste usually black. *Surface texture and color*: outer surfaces seemingly paddled, while inner ones pressed with hand; surface color usually black or gray, but a few sherds reddish and buff. *Thickness*: 4 to 7 mm.

Decoration: *Technic*: incised paddle impressions on soft clay. *Design*: grooves 1.5 mm. wide with land of 1 mm., at Iyatayet and Nanvak Bay. Impressions on some Iyatayet sherds have 7 lands and 6 grooves. In the University of Alaska collections is an unassociated paddle from Jabbertown near Point Hope which can be used to make similar imprints. There are also a few sherds from the Near Ipiutak site at Point Hope which were impressed with such a paddle. The Jabbertown walrus ivory paddle has diagonal grooves on the concave surface and check stamps on the opposite side. The land of the impressions on clay is 1 mm. wide while the grooves are 1.6 mm. wide. *Distribution*: over entire pot.

Form: *Total vessel*: disc-shaped bottom with cylindrical sides and outward flaring rim and lip; slightly rounded bottom with vertical sides, or small disc-shaped bottom and sides flaring slightly and uniformly to lip. *Rim*: thin and nearly vertical, some curving slightly inward, others curving slightly outward. *Lip*: flattened with rounded edges or occasionally inverted V-shaped. *Base*: thickened, flat, and circular, with smaller diameter than body; some curved while others almost globular; a few flat and concave.

Geographical Range: Jabbertown, Point Hope, Iyatayet, and at Nanvak Bay.

Associated Types: Plain and Norton Check Stamped.

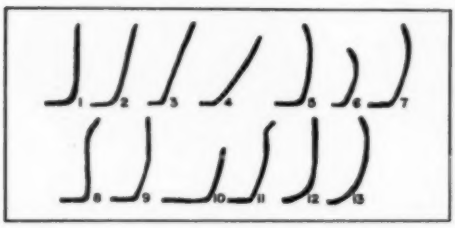

FIG. 17. Generalized vessel shapes of Alaskan pottery.

Chronological Position: middle clay layers containing type at Iyatayet dated approximately 50 B.C. to A.D. 500 by radiocarbon method.

Relationship: unknown.

References: Giddings 1949: 88-9; Griffin 1953: 40-2; Johnson 1951: 15-16; Larsen and Rainey 1948, Pls. 82, *12*; 86, *18*; Larsen 1950: 183; University of Alaska collections; correspondence with J. B. Griffin and H. Larsen.

Norton Check Stamped (Fig. 17, *2, 7* and possibly *3, 8, 12*)

Description: Griffin 1953 (preliminary statement).

Ware Characteristics: same as Norton Linear Stamped from the Iyatayet site.

Decoration: *Technic*: check-stamped paddle impressions on soft clay. *Design*: check squares 2 to 4 mm. wide separated by narrow land. Some of the checked type illustrated by Giddings (1949, Fig. 4) have rectangular impressions differing somewhat from the squares. The stylistic range of the checks seems to run from small squares to small rectangles. The convex side of the Jabbertown paddle mentioned previously has Norton Check Stamps which are from .8 to 2 mm. wide and from 3 to 7.4 mm. long, with the land between approximately 1.7 mm. wide. Still another unassociated pottery paddle was found at Jones Island, east of the mouth of the Colville River. It has more nearly square checks ranging from .7 to 2 mm. in width and from 2 to 3 mm. in length, while the separating land is from 1 to 2 mm. wide. Although the design shape of the Norton Check Stamped type appears to vary somewhat, the checks are uniformly small and close together. *Distribution*: unknown.

Form: possibly same as the Norton Linear Stamped at the Iyatayet site with addition of 2 variants. A check-stamped vessel from Kulik Camp on Lower Manwhyenuk Lake at the head of the Alaska Peninsula has a flat bottom and sides that flare to approximately ¼ of the distance from the mouth and then constrict rather sharply to the rim. From the Chagvan Bay site there are flat-bottomed, flower-pot-shaped check-stamped vessels.

Geographical Range: inland on the Alaska Peninsula and sporadically along coastal Alaska from Bristol Bay north to Jones Island.

Associated Types: Norton Linear Stamped and a plain type.

Chronological Position: approximately 50 B.C. to A.D. 500 at Iyatayet (radiocarbon dating) and an estimated A.D. 1000 by Larsen at Chagvan Bay.

Relationship: great similarities with Nunivak Check Stamped, the form from which Deering Pyramid Paddled developed.

References: Giddings 1949: 88-9; Griffin 1953: 40-2; Johnson 1951: 15-16; Larsen 1950: 181-3; Oswalt 1953b: 5-18; University of Alaska collections; correspondence with J. B. Griffin and H. Larsen.

Nunivak Check Stamped (Figs. 16, 5, 6; 17, 8, 9)

Description: de Laguna 1947. (A detailed study of archaeological pottery from Nunivak Island is being prepared by James Van Stone.)

Ware Characteristics: *Method of manufacture*: probably patch modeling. *Temper*: fine gravel or sand. *Paste texture and color*: coarse or quite fine; usually black, occasionally buff. *Surface texture and color*: generally smooth; black. *Thickness*: approximately 5-7 mm.

Decoration: *Technic*: design applied to wet clay with pottery paddle. *Design*: checks tending to be square and large but ranging from approximately 1.5 mm. to 6 mm. with narrow separating land; some of the finer examples blend into Norton Check Stamped. *Distribution*: probably over entire vessel.

Form: *Total vessel*: flat-bottomed, straight-sided with slightly everted lip; sides also flaring slightly to middle and then continuing straight to rim; or jar shaped. *Rim*: straight, curving in or flaring out. *Lip*: rounded. *Base*: flat.

Geographical Range: concentrated in Nunivak-Nelson Island region but also occurring at Kotzebue, Cape Nome, and rarely on St. Lawrence Island.

Associated Types: Yukon Lined, Yukon Line-Dot, and possibly Norton Check Stamped.

Chronological Position: majority of sherds relatively recent on present evidence, but a few from Old Bering Sea culture possibly of this type.

Relationship: Nunivak Check Stamped probably ancestral to Deering Pyramid Paddled.

References: Collins 1928: 254-6; 1937: 169; Geist and Rainey 1936: 223; Griffin 1953: 40-2; de Laguna 1947: 226-58; Oswalt 1952a: 18-29; Rainey 1941: 536, 550; Van Stone, personal communication.

Deering Pyramid Paddled (Fig. 16, 8; 17, 2)

Description: Oswalt 1953b.

Ware Characteristics: *Method of manufacture*: probably patch modeling. *Temper*: sand and feathers, crushed rock alone, or feathers, crushed rock, and pebbles. *Paste texture and color*: coarse temper protruding through surface; cores black or gray-black. *Surface texture and color*: sherds tending to exfoliate, roughly smoothed; black or gray in color. *Thickness*: approximately 11 mm., ranging from 8 to 18 mm.

Decoration: *Technic*: paddle applied horizontally below rim on plastic clay. *Design*: Check stamps in single row and shaped like inverted pyramids; checks approximately 4 mm. square with land of approximately 1 mm. (See Oswalt 1953b, Fig. 2, for illustration of paddle form.) *Distribution*: unknown.

Form: *Total vessel*: flat-bottomed with slightly flaring sides; 1 vessel collected by Gordon (1906, Pl. 24, 2) seemingly of this type judging from illustration; 1 sherd has suspension hole. *Rim*: straight (little evidence). *Lip*: rounded or flat (2 sherds and 1 vessel available). *Base*: Disc-shaped (1 vessel).

Geographical Range: Cape Nome, Deering, and in the "Bering Strait region" as indicated by illustrated vessel of this type (?) (Gordon 1906, Pl. 24, 2).

Associated Types: Plain, Seward Striated, Yukon Lined, Yukon Line-dot.

Chronological Position: Known thus far from 2 recent sites, one of which dates A.D. 1902 (Deering), and a probable ethnographic source.

Relationship: modern modified form of Norton Check Stamped and Nunivak Check Stamped.

References: Gordon 1906; Oswalt 1952a: 18-29; 1953b: 5-18.

Ahteut Textile Impressed (Fig. 17, 6, 9)

Description: Giddings 1952.

Ware Characteristics: *Method of manufacture*: probably patch modeling over basket. *Temper*: sand, feathers, hair, or sand and pebbles. *Paste texture and color*: 2 forms, one hard and rather well-consolidated, other thick, crumbly and coarse; gray to light brown throughout. *Surface texture and color*: smoothed so carefully that temper rarely protrudes; inner surface may be impressed with piece of fabric used as anvil or as vessel mold. These pots appear to have been quite well fired in relation to most Eskimo pottery. *Thickness*: from .6 to 1.5 cm. with average of .7 cm.

Decoration: *Technic*: "Impressed on the inner surface with some form of closely woven textile, probably in some cases whole twined baskets around which clay vessels were molded" (Giddings 1952: 95). *Design*: closely woven textile or twined basketry impressions on vessel interior; Ahteut Curvilinear Paddled design sometimes on outer surface of pots with inner textile imprints. *Distribution*: On inner surface of vessel.

Form: *Total vessel*: flat-bottomed with sides flaring sharply or evenly sometimes constricting slightly at neck; some sherds from Ahteut site noted to have suspension holes. *Rim*: slightly thickened and pinched to slope inward, have an outward bulge, or an inward and outward bulge. *Lip*: usually rounded but occasionally somewhat squared; one lip with diagonal lines across top, another with herringbone design on top. *Base*: small and disc-shaped.

Geographical Range: primarily the Kobuk River.

Associated types: Ahteut Curvilinear Paddled. Some vessels have Ahteut Textile impressions on the inner surface and Ahteut Curvilinear Paddled impressions on the outer surface and may be more correctly designated as Ahteut Curvilinear Paddled-Textile type. There is also a plain type present.

Chronological Position: common in a site dating A.D. 1250, rare by 1400 and unknown thereafter.

Relationship: unknown.

Reference: Giddings 1952: 95.

Barrow Curvilinear Paddled (Figs. 16, 9; 17, *1*(?), *13*)

Description: Mason 1930.

Ware Characteristics: *Method of manufacture*: (?). *Temper*: pebbles and gravel. *Paste texture and color*: coarse, crumbly; most often black. *Surface texture and color*: roughly smoothed; black. *Thickness*: averaging slightly over 1 cm.

Decoration: *Technic*: design applied with bone or ivory paddle to moist clay. *Design*: either concentric circles or spirals from paddles with negative impressions cut into them. There does not appear to be a chronological difference between the 2 slightly different designs, especially since 1 paddle is reported to have both forms (de Laguna 1947: 234). Often the impressions are so obscure that it is not possible to determine which has been used. *Distribution*: unknown.

Form: *Total vessel*: cylindrical with an unknown type of bottom at Point Barrow. Barrow Curvilinear Paddled design was found on globular pots at Point Hope in the Tigara burials and near East Cape, Siberia, on vessels with conical to rounded bottoms and slightly constricted mouths. *Rim*: (?). *Lip*: rounded. *Base*: probably conical to rounded.

Geographical Range: coastal Alaska from the Colville River mouth west and then south as far as Cape Denbigh.

Associated Types: at Kotzebue houses dating shortly after A.D. 1400 the type is found associated with an occasional Nunivak Check Stamped sherd, thong-wrapped paddle-impressed or mat-impressed vessel bottoms, and Seward Striated sherds. In some of the Tigara burials there are types other than the one under consideration, but since these graves cover a considerable time span, estimated from approximately 1400 to 1850, and have not been broken down more precisely, it would be unwise to list any specific associations without further data concerning the types from the individual graves.

Chronological Position: from an estimated A.D. 500 for the Point Barrow Birnirk site to an estimated 1250 for Western Thule. During at least part of the Tigara phase at Point Hope, this type was in vogue, while in the Kotzebue region evidence suggests that it died out shortly after 1400.

Relationship: similar to but of poorer quality than Ahteut Curvilinear Paddled.

References: de Laguna 1939: 334-43; 1947: 226-58; Larsen and Rainey 1948, Pls. 91, 8, *10*; 95, *20*; Mason 1930: 383-94; Van Stone, personal communication; University of Alaska collections.

Ahteut Curvilinear Paddled (Figs. 16, 9; 17, *4*)

Description: Giddings 1952.

Ware Characteristics: *Method of manufacture*: probably patch modeling. *Temper*: feathers, sand and hair, or feathers and pebbles. *Paste texture and color*: well consolidated; dark brown to black. *Surface texture and color*: surfaces well smoothed and ware well fired; brown to black. *Thickness*: averaging .8 cm.

Decoration: like Barrow Curvilinear Paddled.

Form: like Ahteut Textile Impressed as well as a form with a comparatively small disc-shaped bottom and widely flaring sides.

Geographical Range: fine quality concentric circle paddled type of above vessel form known only from Ahteut.

Associated Types: Ahteut Textile Impressed and a plain type.

Chronological Position: first recognized occurrence at the Ahteut site dating shortly after A.D. 1250; absent soon after 1400.

Relationship: organically tempered fine quality of Barrow Curvilinear Paddled.

References: Giddings 1952: 95; University of Alaska collections.

Seward Striated (Figs. 16, *7*; 17, *1, 2, 5, 11*)

Descriptions: de Laguna 1947; Oswalt 1953b.

Ware Characteristics: *Method of manufacture*: patch modeling. *Temper*: feathers or hair and crushed rock, sand or sand and grass. *Paste texture and color*: crumbly and tends to exfoliate; black core (little evidence). *Surface texture and color*: although roughly smoothed, exterior surface frequently irregular, with temper protruding; black through gray and reddish buff. *Thickness*: 8 mm. (based on 8 sherds).

Decoration: *Technic*: design applied on wet clay with stick or possibly paddle. *Design*: short horizontal striations in vertical series. At Cape Nome this design is sometimes (4 out of 23 sherds) beneath horizontal encircling lines or horizontal lines with short vertical lines (1 sherd). *Distribution*: from near rim to bottom or close to bottom.

Form: *Total vessel*: situla, barrel, and cylindrical or bucket-shaped; one of the situla-shaped pots (Kobuk River) with suspension hole. *Rim*: often scalloped or decorated with short diagonal lines. *Lip*: rounded or inverted V-shaped and scalloped; probably other forms as well. *Base*: flat or rarely concave (Kobuk River).

Geographical Range: Seward Peninsula north to Point Hope and on the Kobuk River.

Associated Types: Plain, Deering Check Stamped, Yukon Line-dot, Yukon Lined, comb-marked and cord-wrapped stick impressed. The Seward Striated sherd illustrated with Barrow Curvilinear Paddled at Ahteut (Giddings 1952, Pl. 24, 5) is intrusive.

Chronological Position: present but uncommon at A.D. 1450; common thereafter.

Relationship: decorative arrangement of some comb-marked ware similar to Seward Striated, but which influenced the other not clear.

References: Giddings 1952: 94-5; Gordon 1906; de Laguna 1947: 226-58; Mathiassen 1930; Nelson 1899; Oswalt 1952a: 18-29; Van Stone, personal communication.

Yukon Line-dot (Figs. 16, *1*; 17, *2*, *11*)

Descriptions: de Laguna 1947; Oswalt 1952a.

Ware Characteristics: *Method of manufacture*: patch modeling except for coiling at St. Michael described by Nelson (only ethnographic description of coiling from Alaska). *Temper*: usually both organic and inorganic in form of grass, feathers, leaves, and crushed rock, sand, or gravel in various combinations; at Hooper Bay Village, all sherds crushed rock or pebble tempered (1) except for 9 grass tempered examples; temper usually rather fine but occasionally extremely coarse. *Paste texture and color*: much of ware rather compact, but some sherds tending to exfoliate; cores are usually black. *Surface texture and color*: generally sufficient smoothing so that temper not protruding through surface; varies from black to gray to brown with some buff or reddish examples. *Thickness*: .5 to 2.5 cm. on the lower Yukon River and from 2 to 10 mm., with an average of 8 mm., at Hooper Bay Village.

Decoration: *Technic*: line impressions made on wet clay with broad or narrow sticks or pieces of bone; dots made with oval, round, or split-ended sticks. *Design*: usually from 1 to 7 horizontal encircling lines near rim; 1 or more rows or groups of dots below; pattern sometimes repeated farther down side of vessel, or modified and repeated. Considered at this time to be within the range of stylistic variation are series of dots alone, short vertical lines below the horizontal lines, a double V beneath the lowest horizontal line, dots between diagonal or vertical lines which extend from the horizontal lines. Rarely line-dot or dot patterns occur just inside the vessel rim. Probably associated with these designs are grass mat or line impressions on the outer surface of flat-bottomed pots. *Distribution*: confined to near rim or at least to upper third of vessel, except for mat or line impressions on outside base.

Form: *Total vessel*: situla shape (flat bottomed with sides flaring slightly to neck, constricting and flaring again at rim). Quite often line-dot decorated vessels have ridges and grooves on the outside, inside, or on both surfaces. In the southern Bering Sea region this vessel form is usually shorter and broader than it is in the north. Some situla-shaped pots have suspension and/or mending holes. It is also probable that vessels with disc-shaped bottoms and slightly flaring sides were sometimes Yukon Line-dot decorated. *Rim*: flared. *Lip*: considerable variation with flattened or rounded most common; other recurrent forms flat and sloping outward, flat and sloping inward, flat with incised line or groove around top, and inverted V-shaped with or without outward bulge; occasionally ornamental knob or scallop. *Base*: heavy, flat, and sometimes grass mat or line impressed.

Geographical Range: Seward Peninsula south to Bristol Bay and inland on the lower and middle Yukon and upper Kuskokwim rivers.

Associated Types: Plain, Yukon Lined, Seward Striated, Nunivak Check Stamped, Deering Pyramid Paddled, Hooper Bay Zigzagged, Hooper Bay Shell Striated, cord-wrapped stick impressed, comb-marked, mat- or line-impressed bottoms, and, rarely, line-impressed vessel sides.

Chronological Position: no evidence that ware much earlier than A.D. 1600; treering dating supports the manufacture of the type after this time and down to historic contact.

Relationship: none in Alaska.

References: Gordon 1906: 84; Heizer 1949; de Laguna 1939; 1947: 226-58; Larsen 1950: 180; Nelson 1899; Osgood 1940; Oswalt 1952a: 18-29; 1952b: 73; 1953a, b, c; University of Alaska collections.

Yukon Lined (Figs. 16, *2*; 17, *10*, *11*)

Descriptions: de Laguna 1947; Oswalt 1952a.

Ware Characteristics: same as those of Yukon Line-dot.

Decoration: *Technic*: sharp or blunted stick drawn across wet clay. *Design*: from 1 to 7 horizontal lines encircling vessel near rim. *Distribution*: approximately upper third of pot.

Form: *Total vessel*: usually situla shape; however, design present on recent St. Lawrence Island pot rectangular with flat bottom and pierced suspension lug at each corner. Other line-decorated sherds from St. Lawrence Island pots are so small that it is not possible to determine the vessel shape, but it should be noted that situla shapes have not been reported from this area.

Geographical Range: common on Seward Peninsula and south to Bristol Bay; rare on St. Lawrence Island.

Associated Types: same as those of Yukon Line-dot.

Chronological Position: same as that of Yukon Line-dot.

Relationship: no known Alaskan base.

References: de Laguna 1947: 226-58; Oswalt 1952b: 18-29; 1953a, b,c; University of Alaska collections.

Hooper Bay Shell Striated (Figs. 16, *4*; 17, *2*, *11*)

Description: Oswalt 1952a.

Ware Characteristics: same as those of Yukon Line-dot.

Decoration: *Technic*: impressions from drawing back of scallop shell (*Clinocardium nuttallii*) rapidly over moist clay. Within the range of variation are striations made by using the back of the shell as a rocker, thereby reproducing the tiny ridges and grooves within and at right angles to the large striations. Another uncommon variant has striations made in one direction and then another, with the latter superimposed on the former. *Design*: fewer than 6 lines in parallel series no more than 2 cm. long; design parallel, diagonal, or perpendicular to lip and rarely in more than one direction on a single sherd. *Distribution*: variation in amount decorated; striations completely covering sides or extending from rim only 5 to 10 cm.

Form: probably situla shape or flat bottomed with flaring sides.

Geographical Range: reported only from Good News Bay and Hooper Bay Village.

Associated Types: Plain, Yukon Line-dot, Yukon Lined, Hooper Bay Zigzagged.

Chronological Position: upper limit historic contact, lower limit thought to be soon after A.D. 1500.

Relationship: none known in Alaska.

References: Larsen 1950: 180; Oswalt 1952a: 18-29; 1953a, b, c; University of Alaska collections.

Hooper Bay Zigzagged (Figs. 16, 3; 17, *2, 11*)

Description: Oswalt 1952a.

Ware Characteristics: probably the same general features as Yukon Line-dot.

Decoration: *Technic*: outer edge of scallop shell (*C. nuttallii*) held at right angles to wet clay and revolved against it. A variant is produced by holding the shell at less than a 45° angle and drawing it out and down against the clay, thus making triangular imprints. *Design*: 1 or 2 horizontal zigzagged lines encircling the vessel near the rim.

Form: probably the same as that of Yukon Line-dot.

Geographical Range: reported in Alaska only from Hooper Bay Village.

Associated Types: same as those for Hooper Bay Shell Striated.

Relationship: none known from Alaska.

References: Oswalt 1952a: 18-29; 1953a, b, c.

Relatively Unknown Types.

Two-tined comb-impressed sherds are reported from recent prehistoric levels on St. Lawrence Island (Oswalt 1953b: 6-8), and other comb-marked pottery occurs at the recent Igloo Point site on the north side of Seward Peninsula (Oswalt 1953b: 9); "brushing or combing" is included as a significant form at the Ekseavik site on the Kobuk River (Giddings 1952: 95).

Sherds bearing impressions made with the side of a rounded stick are present in recent prehistoric levels on St. Lawrence Island, and a roughly similar type marked with a square-ended stick (Oswalt 1953b: 8) also appears here.

Cord-wrapped stick-impressed ware is known from the recent Igloo Point and Cape Woolley sites (Oswalt 1953b: 9), while cord impressions of an as yet undetermined nature appear rarely on the middle-clay-layer pottery at Iyatayet on Cape Denbigh (Griffin 1953: 40-2).

Matting impressions on vessel sides occur on sherds in a Point Hope burial (de Laguna 1947: 230), and there are apparently a few of this type from a Kotzebue house dating approximately A.D. 1450 (Van Stone, personal communication). Gordon also reports that this ware was manufactured at Cape Nome when he visited that region (Gordon 1906: 84).

The temporal sequence of pottery types from Alaska as presented in Figure 18 is based upon interrelated data of varying degrees of probability. Only in the case of the St. Lawrence types is there a continuum based upon direct stratigraphic evidence in a single kitchen midden, Kukulik (Geist and Rainey 1936; Oswalt 1953b: 5-18), which is substantiated by an overlapping of shorter midden sequences at Gambell (Collins 1937). Along the Yukon River relative dating by associated artifacts is applied to the Yukon Line-dot and Yukon Lined types (de Laguna 1947: 226-58), and at Hooper Bay Village scattered treering dates offer a relative placement for these 2 styles, as well as for Hooper Bay Shell Striated and Hooper Bay Zigzagged types. The ceramic sequence among the prehistoric inhabitants of the Kobuk River is linked to a thousand year absolute treering chronology (Giddings 1948: 26-32) so that the relative positions of the Ahteut Textile, Ahteut Curvilinear, and Seward Striated types in this locality can not be reasonably disputed. The chronological position of the Norton Linear Stamped and Norton Check Stamped types is based on radiocarbon dating of associated materials, while the Barrow Curvilinear Paddled type is tied to a relative chronology based upon typology.

A review of the historic pottery users of northwestern North America indicates that they were primarily Eskimos who lived along the Bering Sea coast and Arctic Ocean to the Canadian boundary (Mathiassen 1930: 16); east of the boundary soapstone virtually replaced pottery. Other historic Western Eskimo pottery makers inhabited Kodiak Island (Heizer 1949), the Kuskokwim, Yukon, and Kobuk rivers and probably other small river systems draining Alaska's western and northern shores. Pottery was also used to some degree by the inland Eskimos of the Brooks Range (Solecki 1951: 486; Irving 1953: 78). The Athabaskan Indians of the middle and upper Kuskokwim (University of Alaska collections) and the middle and lower Yukon (de Laguna 1947: 226-58) rivers were also pottery users but to a lesser degree than the adjacent Eskimos. A survey of recent prehistoric pottery distributions does not narrow or extend the historic boundaries any appreciable degree except in the Kachemak Bay region of Cook Inlet; in that area a few sherds were recovered from a recent Eskimo layer (de Laguna 1934: 68) although pottery is not mentioned in the historic accounts of the local Tanaina Indians (Osgood 1937: 104-7).

While it is desirable to construct a skeletal classification system for Alaskan pottery, it seems unwise to lump the types into larger classificatory units until there is a more adequate pottery sample available.

The earliest Alaskan pottery types, St. Lawrence Corrugated, St. Lawrence Plain, Norton Linear Stamped, and Norton Check Stamped, are dominant forms which appear almost simultaneously in the earliest ceramic levels of sites in the Bering Sea region during the first centuries A.D. or slightly earlier. The appearance of linear-stamped and check-stamped forms in the earliest Alaskan pottery levels and the presence of these surfacing technics on certain Asian pottery (Collins 1937: 349-50; Tolstoy 1953: 25-39) strongly suggests that they were Siberian imports into Alaska. A northeastern Siberian culture phase comparable in most respects to Old Bering Sea I was without pottery (Rudenko 1947), but pottery with typical Siberian forms of decoration occurred occasionally in the Old Bering Sea I site at Okvik on one of the Punuk Islands (Rainey 1941: 536, 550), demonstrating that pottery, although absent from an earlier phase of Old Bering Sea I on the Siberian mainland, was introduced into the culture before the Old Bering Sea I site of Okvik was inhabited. The Alaskan culture phases recognized at this time to be considerably older than the above are the lower levels of the Trail Creek caves on Seward Peninsula (Larsen 1951), and the Denbigh Flint complex (Giddings 1949: 85-90; 1950: 18-21; 1951: 193-203), both of which are sherdless. The absence of pottery from the Point Hope Ipiutak culture along with the absence in a collection of nearly 10,000 artifacts of such items as lamps, whaling-harpoon heads, the harpoon-float complex, and a ground-slate industry makes it apparent that Ipiutak is older than and in many ways culturally distinct from Old Bering Sea, in spite of the recent radiocarbon dates for Ipiutak (Johnson 1951: 8-9), while the later Near Ipiutak culture had lamps, whaling-harpoon heads, a few pieces of ground slate and an occasional paddled sherd (Larsen and Rainey 1948, Pl. 86, 18; Larsen 1952: 22-34). It is likely that Near Ipiutak is represented in a later form in the middle clay layers at Cape Denbigh, which have stone artifacts showing flint working technics similar to Ipiutak and Near Ipiutak and an abundance of paddled pottery.

The interrelationships of the various check-stamped forms is confused, but it is recognized

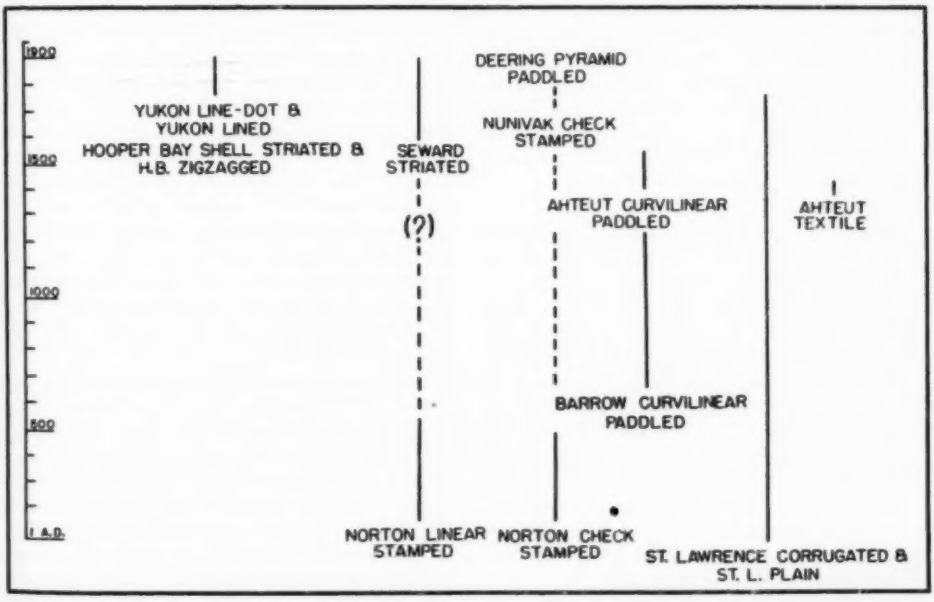

FIG. 18. Alaskan pottery types and their relative placement.

that the Norton Check Stamped type is suggestively old since it is found in the middle clay layers at Cape Denbigh. There is considerable doubt that the Nunivak Check Stamped type is old; the one sherd found by Collins (1937: 169) on the surface of an Old Bering Sea-Early Punuk midden is of the latter type and the Old Bering Sea I lamp sherd (University of Alaska collections) with a check-stamped design is neither conclusively Norton Check Stamped nor Nunivak Check Stamped, while the few check-stamped sherds from the Old Bering Sea I site at Okvik have never been inspected by the writer nor have they been illustrated. It is possible that the large check-stamped type is late, while the small check-stamped pottery associated with Norton Linear Stamped, St. Lawrence Corrugated, or St. Lawrence Plain, and rarely some form of cord-marked type is early. Small check stamps on unassociated sherds are not always indicative of great antiquity, since this type is common from many late Nunivak Island sites, with some of the finest and smallest checked sherds from the Island having been recovered from historic levels (Van Stone, personal communication). The Deering Pyramid Paddled form is obviously a modification of the ordinary check-stamped pattern, and currently there is every reason to believe that it is both restricted to the Seward Peninsula area and late in time.

The Barrow Curvilinear Paddled surface treatment is probably best regarded as a form introduced from Siberia around A.D. 500 and the Ahteut Curvilinear Paddled type as a finer ware having the same surface treatment, feather tempering, and a different vessel form.

The Yukon Line-dot and Yukon Lined types are found generally in the Bristol Bay-Norton Sound region and seem to be later than A.D. 1600. These pottery forms have many connections with Japanese, Kurilean, and Kamchatkan ceramics, a relationship which has been considered elsewhere (de Laguna 1947: 226-58; Oswalt 1952a: 28-9; 1953b: 5-18; 1953c: 395-407). The same relationship applies to the Hooper Bay Shell Striated and Hooper Bay Zigzagged types which are at present limited to the Hooper-Bristol Bay region of the southern Bering Sea region and conspicuously absent from the Bering Strait gateway, yet well represented in Japanese-Kurilean — Kamchatkan pottery collections.

Since this classification is based upon limited samples, many of the ideas proposed are of a preliminary nature, particularly the regional groupings to follow. The St. Lawrence Island types are based upon the largest sampling, and the data suggests the perpetuation of a single localized ceramic style introduced on the island approximately 2100 years ago and persisting relatively unchanged down to European contact in the 19th century. Always coarse and crumbly, this is some of the poorest Alaskan pottery. This tradition spread at a relatively early date to Seward Peninsula and the Arctic coastal region, to persist again until historic contact. No pottery of this style appears in the Norton Sound-Bristol Bay region. The Norton Check Stamped type, also about 2000 years old, is best known from just south of Seward Peninsula at Cape Denbigh. It appears to have spread north from Seward Peninsula to Point Barrow and south as far as southern Bristol Bay. It persisted relatively unchanged (?) on Nunivak Island down to historic times and is slightly modified as the Deering Pyramid Paddled type on northern Seward Peninsula. This type is in general quite well made, with a fine paste, and is far superior to the St. Lawrence Island or coastal forms. The Norton Linear Stamped type is in the same early artifact assemblage as the Norton Check Stamped type; the former appears to have died out after A.D. 1000 or possibly persisted in a modified form as the Seward Striated type. The curvilinear paddled types are found in northeastern Siberia but are of unknown origin beyond this point. In Alaska they may be divided into a coarse coastal type (Barrow Curvilinear Paddled) and a finer interior type (Ahteut Curvilinear Paddled). The Yukon Line-dot, Yukon Lined, Hooper Bay Shell Striated, and Hooper Bay Zigzagged types are comparatively well made, although not as fine as Norton Check Stamped or Norton Linear Stamped types, and restricted to Bristol Bay-Norton Sound in general.

Attempts to correlate the abundance or scarcity of wood for firing with the superior or inferior quality of Alaskan pottery (de Laguna 1947: 227; Giddings 1952: 102, 113) have not yielded any positive results. It is the writer's opinion that this was not an important factor in the manufacture of pottery. Most coastal groups had driftwood enough for fireplaces in the houses and/or out-of-doors cooking fires. Thus far in Alaska the best pottery is not found inland where large quantities of wood are available but rather along the treeless coastal regions. In the middle clay layers at Iyatayet

on Cape Denbigh, the Chagvan Bay site, and at Hooper Bay Village, all coastal sites, were recovered types that were superior to most interior (the exception being some of the Kobuk pottery) and other coastal forms.

It has at various times been suggested that a diffused similarity existed between Alaskan and northwestern Plains ceramic technics. This unity was proposed by Sapir (1923: 247-53), elaborated upon by Wissler (1950: 69-70) but questioned by de Laguna (1947: 248). If such a technological relationship did exist, it would be highly significant on distributional grounds and demonstrate that a 2000-mile spatial gap without pottery is insignificant to its spread. A comparison between certain Alaskan and western Plains pottery technics offers many positive similarities (Mandan, Hidatsa: Wissler 1950; Blackfoot: Ewers 1945; Sanpoil and Nespelem: Ray 1932; Sarcee: Sapir 1923; Kutenai: Schaeffer 1952; Eskimo: Giddings 1952, de Laguna 1947, Oswalt 1952a, 1953b; Chugach: de Laguna 1947). These include birch-bark molds (Koyukuk and Kutenai), basket molds (prehistoric Kobuk River inhabitants of Alaska, Sanpoil, and the Nespelem), direct molding (Koyukuk, Mandan, Hidatsa, and Sarcee), cylindrical shape (Eskimo, Blackfoot, and Kutenai), clay figurine (one from a prehistoric Eskimo site on St. Lawrence Island, Chugach Eskimo, and the Sanpoil, Nespelem, and Sarcee), hair temper (Eskimo, Sarcee, and Kutenai), water testing of a finished vessel (Eskimo, Blackfoot, and Kutenai), and oiling of vessels (Eskimo, Kutenai, Mandan, Hidatsa, and Blackfoot). It is of course realized that some of these features may be found among any pottery-using people, but the important fact is that these particular technics all are common to 2 geographically disconnected groups who are the most proximal pottery manufacturers in northwestern North America.

Studies by the writer have attempted to relate similar Alaskan and northeast Asian potteries (Oswalt 1953b, c), and an elaborate comparative analysis of Eurasian and North American ceramic styles has recently been published by Tolstoy (1953). Consequently, comparison of Alaskan and exotic ceramics will not be considered again at this time.

The observed similarities between certain Eurasian and eastern North American pottery types are intriguing and have received varying degrees of attention through the years (McKern 1937: 142; Griffin 1946: 45; Gjessing 1948: 300-1). While the hypothesized connection between the types of these 2 regions is stimulating, it is not grounded upon a consideration of the present archaeological facts in the area of the proposed Bering Strait gateway. For on the Alaskan side, as this paper should demonstrate and as Gjessing (1953: 132) has in part noted, there are no recognized pottery styles much older than 2000 years, and while the oldest forms of surface treatment have counterparts in adjacent areas of northeastern Asia, they do not have the distinctive features of the correlated Eurasian- Northeastern North American ceramic developments.

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April, 1954

JADE AND STRING SAWING IN NORTHEASTERN COSTA RICA

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COSTA RICAN jade ornaments have been known chiefly through collections made by Padre José Maria Valasco in the Nicoya peninsula, which forms the northwestern corner of the country, and through the subsequent publication of these specimens by C. V. Hartman (1907). The Velasco jade is now in the Museo Nacional at San José and the Carnegie Museum of Pittsburgh.

The term jade is loosely used by archaeologists. Hartman employed it to describe 3 minerals: a blue-green jadeite, saussurite, which in Costa Rica usually is blue-green with white spots, and a dark green bowenite. These shades are characteristic of Nicoya specimens but not of the jades of northern Central America and Mexico. More recently, W. F. Foshag has identified the principal minerals used for ornaments in Costa Rica as diopside-jadeite and chalcedony (Anonymous 1947, Specimens 1-7, 15-18).

Hartman wrote (1907: 85), correctly for his time, "On the whole mainland of Costa Rica objects of jade are very rare. In all my excavations on the highlands I only came across a few small beads of this mineral. But some fine specimens of jade amulets have been found sporadically in graves on the slopes of Irazú [volcano], and even on the Atlantic coast at Mercedes, and one or two other places. All these finds, however, have been of Nicoyan origin."

In addition to the Nicoyan jades, it can now be stated that a second center of aboriginal jade manufacture existed in Costa Rica. In recent years, many jade carvings have been brought to light in the vicinity of the town of Guápiles in northeastern Costa Rica. This area produced its own styles and technics, which we propose to discuss, as well as their relationship to other regions. I am indebted to Carlos Balser of San José who has recently published on Costa Rican jades (1953) and has kindly sent me photographs for my illustrations.

The town of Guápiles is on the Atlantic coastal plain northeast of Turrialba volcano. It marks the end of the *linea vieja*, an unfinished railroad line which passes the well-known Las Mercedes archaeological site. The distance between the two is only about 10 miles but the archaeological remains are radically different, for Guápiles was a trading center which both imported and copied pottery, gold, and jade of foreign styles from as far away as Honduras and Panama. Although Mercedes is close to Guápiles and has been ransacked for the last 70 years, only 2 examples of Guápiles jade are on record as being found there (Skinner 1920), apart from the vague statement of Hartman already quoted. Guápiles jades are of many forms but may be divided into groups on the basis of shape, stylistic affiliations, or technic of manufacture. We shall discuss first the types which show the

Fig. 19. Jade pendants. Vicinity of Guápiles, Costa Rica.
Scale, 9/10. Balser collection.

Fig. 20. Jade pendants. Vicinity of Guápiles, Costa Rica. Scales: *a, b, d, f, h,* 1/1; *c, e, g,* 9/10; *i,* 2/3. Balser collection.

influence of other areas, then the local styles, and lastly the local technic.

Group 1. Types Related Both to Nicoya and Northern Honduras. Hartman (1907) illustrates nearly 300 ornaments of stone from Nicoya, most of which could probably be classed as jade. About a third of these are various types of "ax gods" such as are seen in Figure 19, *n-p*. This name was applied to these specimens on the theory that, when a finished celt proved to be of very fine stone, it was sawed in half, drilled for suspension as a pendant, and the outer surface was carved to represent a god. It is indeed true that the backs of many pieces show the marks of sawing. It is also true that complete celts of jadeite or chalcedony have rarely been found in Costa Rica, nor is there any record of a partly divided celt. On the other hand, jadeite boulders illustrated by Hartman (1907, Pl. 32, *1-4*) reveal cuttings which correspond to the backs of ax gods in size, shape, and technic. By far the greatest number of ax gods has been found in the Nicoya peninsula, where the greatest diversity of forms also occurs. They are not uncommon in the Guápiles region where they constitute about 7 percent of the jade carvings as compared with over 30 percent in Nicoya. Simplified and smaller ax gods also are found on the north coast of Honduras, especially in the vicinity of the Guaymoretta Lagoon (Stone 1941: 52; Strong 1948: 81-3).

Another type of jade artifact with a similar distribution consists of large tubular jade beads (Fig. 21). In the Guápiles region they are about an inch thick and up to 14 inches or more in length. The Honduranean examples are fatter and a little shorter. The Nicoyan specimens also are smaller. In a private collection we have seen pieces fully as big as those from Guápiles, said to have been found on the Rio Frío on the north slope of the volcanoes above Lake Nicaragua. These beads were drilled from both ends with such skill that the 2 holes meet almost exactly.

The geographical distribution of these jades seems peculiar, but other types of artifacts also link these distant areas. We may mention related pottery and figurine types found in northern Honduras and northeastern Costa Rica (Lothrop 1926: 374). Also similar pottery, figurines, and metates are recorded in northern Honduras and northwestern Costa Rica (Spinden 1925; Lothrop 1926: 168-9, 273-5). The cultural connections between these areas are in fact stronger than the publications cited would indicate, for there is much still unpublished evidence. The only serious attempt to explain this distribution (Spinden 1925) was the suggestion that a predominantly Chorotegan culture once extended from the southeastern Maya frontier to the borders of Panama. In recent years, however, local cultures such as Coclé and Veraguas have been distinguished in Panama, and it has been possible to show that their products, especially gold jewelry, were traded by land and by sea as far north as Yucatan and central Mexico. These known journeyings may better account for the appearance of Costa Rican styles in Honduras and vice versa than the concept of a common cultural tradition, which, however, is not entirely ruled out.

Group 2. Types Related to Isthmian Gold Jewelry. Another class of Guápiles jades, illustrated in Figure 19 *a-d, g*, is grouped together because they repeat in stone well-known Panamanian styles of cast metal ornaments. The birds (*b, g*) are of the type called "eagles," the commonest form of cast pendant in the Province of Veraguas, which was traded to the north as far as Yucatan. The frog (*a*) also is a common Veraguas shape (Lothrop 1950, Figs. 71-9, 96-8, 138). The animal with a curling tail (*c, d*), which has been identified as a cebus monkey, is characteristic of Coclé but several gold examples have been unearthed near Guápiles (Lothrop 1937, Figs. 169-73; 1950, Fig. 141; 1952, Fig. 108). The bird with a long beak (*f*) also occurs in Coclé but in stone rather than gold.

The Guápiles jade frogs and monkeys are types also recorded from the Nicoya peninsula (Hartman 1907, Pls. 40, *1-10 13-6*; 41, *11-4, 19, 20, 23*). The Nicoya examples, however, tend to be less vigorously rendered. The people of Guápiles evidently maintained direct trade contacts with Coclé and Veraguas, but they made local copies of foreign forms which pleased them. This confirms a statement made to Columbus in 1502 (1744: 585) by the natives of Cariay, now Port Limón, that they traded along the coast of Panama as far as a town named Cubigua. This is located by Morison (1942 Vol. 2: 353, 360) between the Belén and Coclé del Norte rivers.

Nicoyan contacts with Panama seem to have been principally with the Province of Chiriquí

as attested by the large number of Chiriquí figurines and whistles found in Nicoya and by stylistic influence noted on local pottery. As recently as 1882, a party of Indians from Chiriquí travelled to Nicoya to fish for pearls (Bransford 1884: 823).

Group 3. Types Related to Panama and the Caribbean. "Winged" pendants are a type of ornament found in Costa Rica, Panama, northern Colombia and Venezuela, and in the West Indies as far north as Puerto Rico (Lothrop 1937: 163). The usual form is a flattened, elongated oval which was suspended horizontally. The material may be jade, agate, or other stones, or shell. Occasionally the body and head of a bat were carved in the center, and the whole, either with or without the carving, evidently symbolizes a bat with extended wings. Figure 20 *a*, illustrates an example found near Guápiles, which is perhaps the most complex yet recorded. The head with pointed ears and the short legs are typical. The wings, however, are elaborately carved to represent crocodile heads in profile. Hartman has published an almost equally intricate jade example from Nicoya as well as simpler specimens which make possible the bat identification (1907, Pls. 41, 3, 6, *7*; 44, 6, *7*).

Group 4. Types Related to Peru. The Guápiles jades still to be described are particularly characteristic of the area, for they have been manufactured at least in part by string sawing, a technic to be discussed presently. A group which cannot be very exactly defined consists of human or anthropomorphic figures shown in profile. The head may be angular and often there are projections on top of it (Fig. 19 *k*). In some cases, the figure carries a staff or a serpent in front of the body (Fig. 20 *e-g*). These features and the position of the body give an impression of remote coastal Tiahuanaco influence from Peru, more clearly discernible in stone carvings from the Diquís delta in southwestern Costa Rica.

The expansion of Tiahuanaco art motifs from a small district in southern Peru far to the north and south is a phenomenon which archaeologists have traced in some detail but have not yet satisfactorily explained. Blending with local styles and degeneration of the original Tiahuanaco forms to the point where they can scarcely be recognized have both been noted. Curiously enough the closest parallels to the Guápiles jade figures occur on the southern margin of Tiahuanaco influence in Chile, where small wooden figures of comparable shape were cut in part by the string technic (Bennett 1954, Fig. 114, *right*).

Group 5. Presumably Local Types. We have eliminated, so far as was possible, all Guápiles jades which show any outside influence in their form. The remainder, at least at present, may be regarded as types which developed locally. One of these, illustrated in Figure 19 *m*, is a square-mouthed, broad-nosed, anthropomorphic figure shown full face. Two small animal heads in profile form a headdress. There are also small animal heads flanking the hips and knees, recalling gold anthropomorphic pendants from Veraguas (Lothrop 1950, Figs. 110-6). This piece as a whole, however, does not belong with any standard group of Veraguas gold. One of the jade specimens found at Las Mercedes by Skinner (1920, Pl. 1) evidently is of the same type. Figure 20 *h*, shows a weird female figure surrounded by a stirrup-shaped frame, all cut from one piece of jade. The head consists of a horizontal rectangular block with no other features than 2 eyes. It is surmounted as usual by 2 small animal heads in profile. These heads and the frame evidently have some symbolic significance by themselves. A specimen in the Balser collection portrays a similarly shaped frame and heads with no enclosed figure, and there is another piece of this form in the Bliss collection. A specimen published by Skinner (1920, Pl. 2) perhaps belongs in this group.

Animal figures of various types are found near Guápiles, of which the most definite is a monkey which can be recognized by its tail (Fig. 19 *e*, *h*, *i*). Birds are shown in profile (Figs. 19 *l*; 20 *b*, *d*), all marked by exaggerated beaks, which in 2 cases have become spirals. A realistically curled snake appears in Figure 20 *c*. One feature shared by all these pieces is that their forms, simple or complex, could only be created by string sawing.

Jade-working Technics. Very little is known about aboriginal methods of stone working in Middle America beyond what can be learned by inspection. This seems to be true of other areas, with the result that far more has been published on easily seen flaking than on abrasive technics. Sahagún's description of Mexican jewelers (Seler 1892: 418-20) is unduly vague, and it applies to the final shaping and polishing. He wrote of grinding one stone against

another, scraping (or incising?) tools of flint or bronze, the use of sand or emery as abrasives, and a final polishing with hard wood such as bamboo.

Saws may be of 2 kinds. If the saw is harder than the material to be cut, it operates by direct abrasion. If the material to be cut is the harder, then an abrasive agent such as sharp sand must be employed and the saw itself replaced when it wears out. Flat saws for slicing jade presumably were thin slabs of very hard wood. The slots of unfinished cuts in jade may be as narrow as 0.2 cm. (Lothrop 1936, Fig. 66 *i*). If a broad slab was to be cut, usually it was attacked from opposite directions and worked until the central uncut wall was so thin that it could be broken. This left a characteristic rough ridge both on the freed section and main mass. Although it has been suggested that the Nicoya ax gods had been cut with string (Brown 1898: 145), we believe that the specimens themselves and the cores published by Hartman (1907, Pl. 32, 3) definitely indicate a flat-bladed saw.

String sawing, as its name implies, consists of coating string with an abrasive and rubbing it back and forth across the place to be cut. It seems a method better suited to softer material than jade, the cutting of which must have consumed a vast amount of fiber. It had certain advantages over other methods, however, as appears from the following:

1. With a flat saw, all initial cuts must start on an exterior surface. With a string saw, a small hole may be drilled and the cutting started anywhere (Fig. 19 *m*).

2. By string sawing it is possible to cut curved interior lines which could not be made with a flat saw (Fig. 20 *b-d*).

3. Conversely, as is the case with a narrow jigsaw, it is not easy to cut straight lines. Note the wobbly interior of the frame in Figure 20 *h*.

4. It is characteristic of sawing away from a drilled hole that the cut is narrower than the hole (Figs. 19 *m*; 20 *g*), because the string, when pulled tight, becomes narrower.

5. To obtain enough pressure, the string must be bent across the surface to be cut. The end of the cut, therefore, will not be flat but rounded.

Identification of string sawing in Guápiles jades was based primarily on visual examination in the light of the characteristics here noted, but it is supported by eye-witness statements that string sawing was practiced in Panama in the early 16th century. Ferdinand Columbus wrote of the natives of Veraguas (1744: 590), "Their food is fish, which they take with nets and hooks made of tortoise-shell, which they cut with a thread, as if they were sawing; the same they use in the [West Indian] islands." Las Casas (Lib. 2, Cap. 26) confirms this statement and adds that they could cut iron by this method of sawing.

Apart from the Guápiles region, cutting jade with a string is of great rarity but considerable antiquity. We have already mentioned 2 specimens found by Skinner (1920) at the nearby Las Mercedes site. Hartman (1907, Pls. 35, *14*; 39, *31*, 33) illustrates only one certain and 2 possible examples from Nicoya. The most ancient jade object now known which has been cut by string is a large Olmec figurine in the museum at Puebla, Mexico (Covarrubias 1946, Lam. I). It is of the standing type. Arms and hands have been freed from the body by drilling holes in the armpits and by cutting downward with string. This apparently was not a common Olmec practice. An Olmec jade, however, has been found in Costa Rica (Covarrubias 1946, Fig. 18) and the sawing technic there may have been derived from that source. In the Guatemalan highlands at Kaminaljuyú, 2 pieces of Mayan jade cut by string sawing date from the Esperanza (Early Classic) phase (Kidder, Jennings, and Shook 1946, Figs. 148 *f*; 149 *h*). The same authors (p. 121) refer to a similarly cut jade from Ococingo published by Spinden (1913, Fig. 95). Finally, there is a Late Classic Mayan example which was discovered at Nebaj (Smith and Kidder 1951, Fig. 52 *f*). Three other specimens from the Cenote of Sacrifice at Chichén Itzá in the Peabody Museum of Harvard probably are of equivalent date.

It is not our purpose to examine exhaustively the New World distribution of string sawing. In prehistoric times, no doubt it was employed most frequently on softer materials than jade, which often have perished in the ground, and, after the introduction of iron, this technic was abandoned in favor of less laborious methods. We may point out, however, that owing to the unusually arid climate found on the coasts of Peru and northern Chile, many artifacts of bone and wood have been preserved, some of which appear to have been shaped in part by

the string-cutting technic. Sawing with a leather thong and sand was practiced in regions which did not produce proper vegetal fiber to make string.

Another characteristic of Guápiles jades is that there is a lot of fine detail which may be incised or in relief (Fig. 19 *m*, *n*). How this was done and with what tools we cannot be certain. The suggestion has been made that the spines of cactus or tropical vines plus a very fine abrasive might have been employed for such delicate workmanship.

How the long tubular beads were drilled we cannot say. The holes taper slightly from the ends to their meeting point. Obviously a strong drill was needed as there must have been stress from torsion. Two specimens in the Peabody Museum of Harvard are 13 and 14 inches long and about an inch in diameter (Fig. 21). The openings of all holes are 5/16 inch in diameter, tapering to about 3/16 in the center. The larger bar was drilled 8 inches from one end and 6 from the other. This is the deepest drilling of jade yet recorded in the New World.

The Maya in the Classical period wore tubular or rectangular beads of jade as bar pendants, which they drilled from both ends with more taper than appears in Costa Rican examples. The largest Maya specimen we have seen, from the Cenote of Sacrifice at Chichén Itzá, is about 7 inches long or half the size of typical Guápiles bars. The discovery of a large jade boulder during excavations at Kaminaljuyú, Guatemala (Kidder, Jennings, and Shook 1946, Fig. 154 *c*, *d*), indicates that the Maya possessed the raw material to cut beads equal in size to those of Honduras and Costa Rica. That they failed to do so may have been the result of inability to drill them.

Discussion. An unusual feature of Guápiles jades is that in some anthropomorphic specimens the legs have been separated and the arms have been freed from the body (Figs. 19 *m*; 20 *h*). Most aboriginal American stone sculpture is in bas relief and no attempt was made to liberate the limbs from the block. The only jade carvers, apart from those of Guápiles, even to attempt to free the limbs were the Olmec of eastern Mexico, who did it habitually and successfully. This Olmec trait persisted in the sculpture of central and eastern Mexico among later cultures, including Teotihuacan, Huastec, and Aztec, but in softer stone than jade.

Carving of arms and legs in the round also occurs in the central and southeastern United States. Stone statues are uncommon but there are many carved stone effigy pipes.

The Maya very seldom made statues in the round, in spite of their ability to handle large blocks of stone and to carve in high relief. The remarkable architectural sculptures seen at Copan are almost completely in the round but they in fact are mosaics with separate arms, legs, torsos, and heads attached to walls by projecting tenons. The roof combs of Maya buildings often were adorned with realistic sculpture (Tozzer 1941, Figs. 22, 31).

In Costa Rica, apart from jade there are 3 major styles of stone carving. One is centered in southwestern Nicaragua with examples occurring across the border in Nicoya. Very occasionally the arms are cut partly free (Bovalius 1886, Pls. 4, 15, 18, 19; Squier 1852: 52). In northeastern Costa Rica, many stone statues have been found, notably at Las Mercedes (Mason 1945). Characteristically the arms and legs are carved in the round. In the Diquís delta in the southwest another style occurs which often has the arms and legs separated

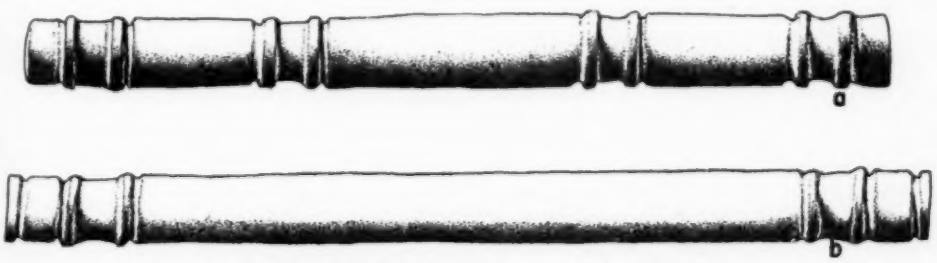

FIG. 21. Calcined jade beads. Vicinity of Guápiles, Costa Rica. Lengths, 13, 14 inches. Peabody Museum, Harvard University.

by slots in the fashion seen in Figure 19 *m*. Finally, in the Province of Chiriquí in Panama, a few statues with freed limbs have been discovered (MacCurdy 1911, Fig. 40).

In South America there are several centers where carving of statues in the round is characteristic. We may mention San Agustín in Colombia, Chavín de Huántar and the Callejón de Huaylas in Peru, and Tiahuanaco in Bolivia. In every case, realism has been sacrificed to symbolism and the carving has been confined to bas relief details.

The natives of Middle America apparently did not mine jade except in Honduras and their principal source of supply was waterworn boulders which they picked up in stream beds. In Maya workmanship, except in the case of large pieces which had to be cut up, the original shape of the stone was modified as little as possible in producing an ornament. In many cases, the backs of manufactured objects still retain the patina produced in the stream. It is characteristic of Costa Rican, Mixtec, and Olmec jades, however, that they have been so cut down that no trace of the original surface remains.

We can say little about origins of the Costa Rican jade industry or of Costa Rican archaeological remains in general. The megalithic statues of Nicoya and Nicaragua are probably not of great age and their stylistic affiliations appear to be chiefly with South America (Richardson 1940: 408-9; Kidder II 1940: 452). The polychrome pottery shared by the Guápiles and Nicoya regions admittedly was inspired in part from the north in its shapes, color technics, and designs. By association in the ground, however, it cannot be dated earlier than the well-known Plumbate ware, which is placed as pre-Aztec but mostly following Classical Maya. The few in situ associations indicate a full development of the Costa Rican polychrome style. The quality of Costa Rican jade rules out all possibility of importation from the north but the local sources may have been discovered long ago. The fact that Olmec (Lines 1942: 222) and Classical Maya jades (Hartman, 1907, Pl. 45, *10*) have been found in Nicoya implies but does not prove an early knowledge of jade.

During the latter part of the Classical Maya period, frequent use of the tubular drill in working jade caused stylistic changes in northern Middle America. This tool, held vertically or diagonally, can cut either a circle or an arc. Tubular drilling was commonly employed in Nicoya in the manufacture of stone club-heads but very rarely for shaping jades. It has not yet been detected in the Guápiles area. The inference is that what technics, if any, the Costa Rican jade workers owed to the north were older than use of the tubular drill for carving jade.

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PEABODY MUSEUM
Cambridge, Mass.
April, 1954

A SHELLMOUND IN MARIN COUNTY, CALIFORNIA

D. J. McGeein and W. C. Mueller

MRN 20, the site described in this report, is one of the 5 located on Strawberry Point, a peninsula which juts out into Richardson's Bay, an arm of San Francisco Bay, in southern Marin County (Fig. 22). Situated on a southwestern slope, Mrn 20 overlooks the bay and town of Marin City. It is of interest to note that most of the shellmounds on Strawberry Point are on the western side, even though this is buffeted by cold winds and rain during the fall and winter, while the less inhabited eastern side is more sheltered. The hills surrounding Mrn 20 are rather gentle and are covered with pasture grasses, with an occasional clump of scrubby, wind-blasted oaks and a few spotty buckeyes. The western face of the site is overgrown with poison oak; the remainder is clothed with a thick matting of grass. The surrounding soil is a yellow clay, which takes on a reddish appearance in some sterile areas beneath the midden.

Rainfall averages 46.38 inches annually, with a high of 10 inches during the month of January, and 9 inches during December and February, and a low of less than 0.1 inch during July and August.

The site lies on the edge of a waterworn sandstone cliff overlooking a sand and gravel beach which becomes a mixture of silt and mud as it meets the murky waters of the bay. Moderate quantities of horse-neck clams (*Schizothaerus nuttallii*), bent-nose clams (*Macoma nasuta*), and bay mussels (*Mytilus edulis*) (Bonnet 1940: 15-21) are to be found when the tide is out.

The supply of fresh water is confined in a rather deep erosion gully about 20 feet south of the main mound mass. This gully separates the site from its neighbor, 4 Mrn 21, and is fed by spring water that starts flowing in the late fall, and continues until late May. The gully and several springs on the point are the only sources of fresh water; the nearest free-running stream is located several miles to the northwest, at Old Mill Creek, near Mill Valley.

Mrn 20, was first reported by N. C. Nelson during his survey of bay area shellmounds in 1909 (pp. 357-426). The records of the University of California Archaeological Survey designate it as 4 Mrn 20. During the 40 years since the original survey, the mound has remained untouched. When revisited in February, 1950, excavation seemed desirable, as the development of housing in this area makes its destruction inevitable within the next few years. Preliminary to excavation a contour map was prepared, and a ½ inch water pipe was driven into the ground to serve as the permanent datum marker. A grid system of 5-foot squares was used to lay out the pits. The site was excavated with shovels in 12-inch levels. Excavation began in April, 1950, and was continued until November, 1951. Most of the work was carried on over weekends and holidays. In all, 3 trenches were dug, and an estimated 250 cubic yards of midden removed, uncovering 19 burials and 91 artifacts, with an average of 1 burial to every 13 cubic yards of

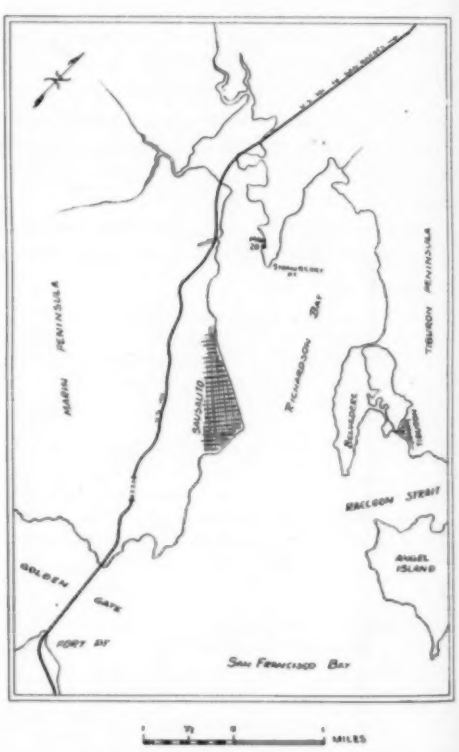

FIG. 22. Location of Site 4 Mrn 20, San Francisco Bay area.

midden and 1 artifact to every 3 cubic yards. Although bay shellmounds in general have very few artifacts, Mrn 20 has the dubious distinction of being the most meager thus far recorded (Meighan 1950).

Composition of the Site. The deposit consisted of a loose shell-bearing midden, roughly oval in shape with an over-all length of 140 feet, and a width of 65 feet. It was mounded to a height of about 2 feet, and extended in depth up to 7½ feet at the western face. A single-column sample taken from the side wall of one of the deeper pits was analyzed by Richard Brooks and a report on sampling technics and his findings follows:

The samples were obtained from an apparently homogeneous part of the side walls going as deep as sterile ground or bedrock. In segregating the soil samples according to components, 3 different screen sizes were used, 3/16 inch or 5 mm., ⅛ inch or 3 mm., and 1/16 inch or 1 mm.; –1/16 comprised that material not held by the 1/16 inch screen size. This method of analysis follows that introduced by E. W. Gifford (1916).

3/16. The shell and rock were segregated and the shell identified as to genus and species, where possible. Family names were used when genus identification was not positive.

⅛. Rock and shell were again segregated. The shell, because of its fragmentary nature, could not be identified positively and was utilized only as part of the total shell percentage. *Mytilus edulis* did not appear to dominate these shell fragments.

1/16. The material held by this screen size consisted of very small fragments of rock and shell, which were too small to be segregated, and were added to the total residue percentage.

–1/16. The –1/16 material was composed of fine silt or soil granules. What appeared to be a very low percentage of shell flakes was also present in this final residue.

Charcoal, nonfish bone, and fish vertebrae were segregated from the sample wherever they appeared, regardless of screen size.

Total average percentages were calculated for shell and rock by combining the 3/16 and ⅛ inch screen sizes. Residue percentages were derived from the combination of the 1/16 and –1/16 inch material. In this manner total average percentages were obtained for all components of the sample, with the exception of those which totaled less than 1 gram. The results are summarized below.

TABLE 2. CONTENT OF MIDDEN, EXPRESSED IN PERCENTAGE OF TOTAL SAMPLE FROM EACH LEVEL.

Depth in Inches	0-12	12-24	24-36	36-48	48-60	60-68	av. %
Shell (3/16 & ⅛)	22.4	25.5	27.8	32.5	71.2	31.0	35.0
Rock (3/16 & ⅛)	24.8	23.1	19.8	19.0	18.1	20.0	20.8
Residue (⅛ & –1/16)	49.8	48.7	46.3	46.8	9.0	44.3	40.8

An analysis of the midden, taken as it was from a single-column sample, shows a more or less equal distribution of *Mytilus* and *Macoma* in all levels except the 48- to 60-inch, in which both increase. In other bay sites (Greengo 1951, Fig. 1 *B*), *Macoma* seems preponderate in the upper levels and *Mytilus* in the lower. The bay adjacent to Mrn 20 is heavily silted which is

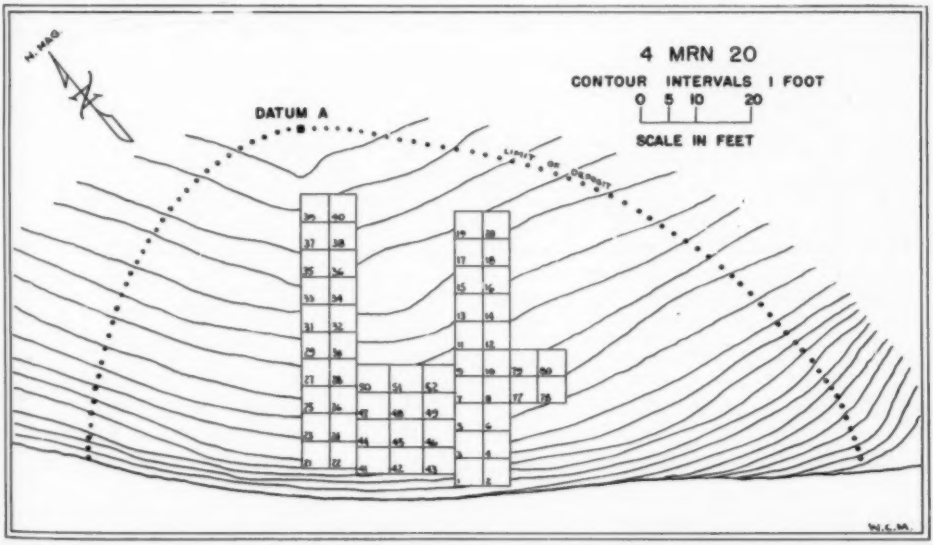

FIG. 23. Site 4 Mrn 20, with location of trenches shown.

well suited to *Macoma*. Although *Mytilus* thrives in rocky waters, "they did not appear to suffer appreciably from the rising of the tide line and the silting in of the bay" (Greengo 1951: p. 8). Since *Macoma* is prominent in all levels of Mrn 20 and confined to upper levels of other bay mounds, this may suggest that the lower levels of Mrn 20 date back no further than the upper levels of the mounds sampled by Greengo.

Features. Fire hearths were scattered throughout the deposit and consisted mostly of rock picked up from the beach. None held any discarded or broken artifacts. A typical hearth, Feature 1, found in Pit 41 at a depth of 30 inches, 31 inches from base, contained 9 fire-blackened stones distributed over an area 19 by 19 inches. An unusual feature was encountered in Pit 3. At a depth of 46 inches a human skull, minus mandible and neck vertebrae, was resting upright on a fire hearth. The rocks were fire blackened and an inch of ash was deposited under them. The skull itself was not scorched and thus appears to have been placed in position well after the ashes had cooled. Over the top of the skull lay an inch of midden, and above this an inch of pure oyster shell (*Ostrea lurida*).

In Pit 8, at a depth of 56 inches, a carbonized log was uncovered that measured 35 inches in length and 14 inches thick. As the ends of the log were being exposed, another section of wood, 40 inches in length, was encountered at the same depth in an adjoining pit. Lying across the top of this log, was a stick, 24 inches long with a diameter of about 1½ inches. The second log, and the stick on it were not removed, since they ran into an area which was not excavated. Ten inches below the first log an infant skeleton was removed. As far as could be determined, the burial was not associated with the log feature.

While troweling in the northern end of Pit 78, a compacted area was encountered at a depth of approximately 2 feet. Closer examination revealed a heavy concentration of clay, thoroughly mixed with shell and tightly packed. Four postholes lying in an irregular line extended 6 to 8 inches into this compact layer. The holes, about 2 inches in diameter, were filled with loose shell midden. It is probable that this area was part of a house floor.

After the removal of Burial 20, which was resting on the 51-inch level, 2 adjoining circular depressions were noted. Just west of the burial, and some 5 inches deeper, examination disclosed 2 circular pits, 4¼ inches in diameter and 6 inches deep. They were connected by a narrow trench a couple of inches long. Another such hole was exposed immediately above and to the north of these, its bottom on the same level as the top of the first two. The pits were cut in the clay on the bottom of the site which was mixed broken shell. All were filled with loose midden material. Their purpose is unknown but it seems likely that they were used as storage pits.

Artifacts. A total of 4 complete mortars and 12 fragments were found, distributed in depth from 23 inches to 61 inches. All are irregular in shape, fashioned from sandstone and microcrystalline rock available in the area. The specimens are rather small, averaging 15.87 cm. in diameter, 10.31 cm. in height, and 4.56 cm. in depth

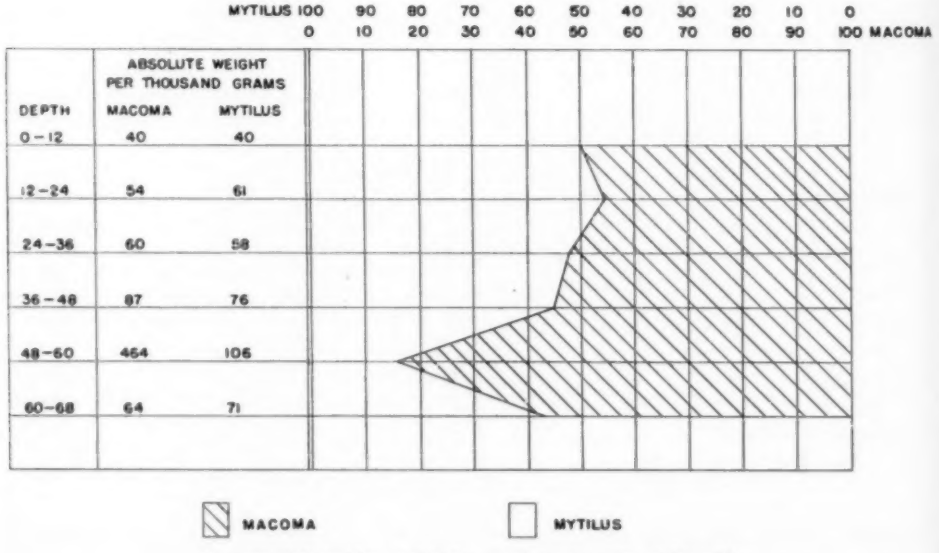

FIG. 24. Relationship of *Mytilus* to *Macoma* at Site 4 Mrn 20.

of depression. All have rounded rims and the sides are pecked in varying degrees.

Only 6 pestles were found, ranging in depth from 8 inches to 58 inches. They are of a hard microcrystalline material, roughly cylindrical in shape, pecked on the sides, and ground smooth on the ends. They vary in length from 9.00 cm. to 14.50 cm.; and in diameter from 4.25 cm. to 6.50 cm.

Nine obsidian and chert scrapers were uncovered at depths ranging from 12 inches to 50 inches. A core tool and chopper were also uncovered. A total of 8 obsidian artifacts that can be classified as knife or spear points or their fragments were also unearthed. The most complete of these, found with Burial 8, is leaf shaped, measuring 10 cm. in length, and 3 cm. wide at the base (Fig. 26 G).

Ten bone awls, and 8 fragmentary specimens were found. Of these at least 14 were made from split cannon bone, while the remainder were designed from long-bone splinters. They were well distributed from 6 inches to 52 inches and were in all stages of preservation (Fig. 27 *B-D, H*).

Two complete and 1 fragmentary wedges of elk antler were recovered. They show signs of heavy pounding on the basal end (Fig. 27 A). Four flakers were obtained but only one is of antler. All were found between 15 and 30 inches (Fig. 27 *E*).

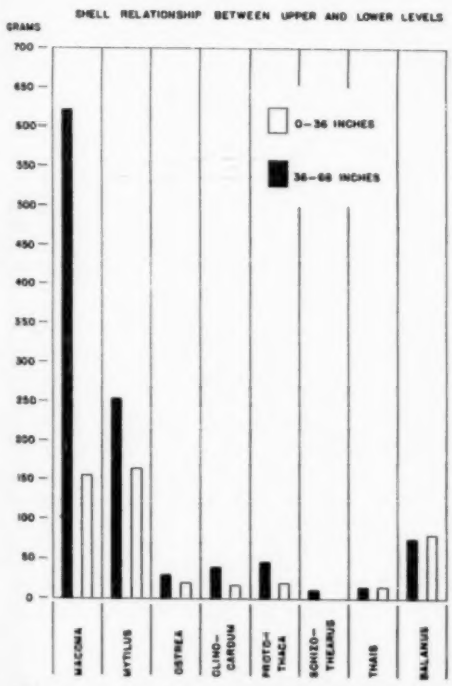

FIG. 25. Site 4 Mrn 20. Proportions of shells in upper and lower levels.

FIG. 26. Artifacts from Site 4 Mrn 20. *A*, pitted hammerstone; *B*, grooved steatite pendant; *C*, flat stone object with edges worn smooth; *D*, fragment of fish tail charmstone; *E*, *F*, black steatite labrets; *G*, obsidian blade.

A single obsidian drill came from a depth of 43 inches. The basal end is almost half round in appearance, while the shaft tapers sharply towards the point. Its over-all length is 4.5 cm. and it is 1.5 cm. wide (Fig. 28 C).

An abrading stone came from Pit 28 at a depth of 36 inches. It is of sandstone and has a shallow spoon-shaped groove on each surface.

There were only 2 definite arrowpoints, both 2.00 cm. in length, and of obsidian. These are side notched and of the "Christmas tree" type, except that the deep serrations are lacking on both specimens (Fig. 28 E, F).

Five net sinkers were found at depths from 33 inches to 49 inches. Two are notched, the remainder grooved.

A single bone gorge hook was found in Pit 42 at a depth of 44 inches. It is 10.5 cm. long, and tapers to a point at either end (Fig. 27 G).

In Pit 43 at a depth of 48 inches, 8 bird-bone beads were uncovered completely isolated from other artifacts or burials. They average 1.75 cm. long, and had an average diameter of .50 cm. (Fig. 28 G).

Shell beads were found with 4 adult burials and with 1 infant. The infant had the most interesting of necklaces with 277 small rectangular Olivella shell beads,

combined with 4 triangular and rectangular Haliotis pendants (Fig. 28). Because of the significance of shell beads and pendants as horizon markers in central California archaeology, these have been analyzed in detail by grave lots.

Burial 7: 18 rectangular Olivella beads made up this grave lot. The specimens are basically rectangular, although the majority are slightly narrower at one end than at the other. Perforation holes were drilled from the concave side. The average dimensions are as follows: width 4.38 mm., and 4.88 mm., length 6.14 mm. The average hole diameter is 1.44 mm. Gifford (1947: 97) classifies this bead as type X3al and, according to Beardsley (1948: 18), it is the form typical of Phase 1 of the Late horizon.

Burial 9: included with this interment were 524 Olivella beads. There are 2 basic shapes represented, rectangular and square. The corners of all beads have been very decidedly rounded, thus giving some of the square type a round or disc appearance. Of the 524 beads the vast majority are biconically drilled. Less than 10 are conically drilled, and these are perforated from the convex side of the shell. Their size range is as follows: rectangular, 5.5 by 4.0 mm. to 8.0 by 7.0 mm.; square, 4.0 by 4.25 mm. to 7.5 by 8.5 mm. The hole diameters range from just a fraction over 1.0 mm. to just under 2 mm. With 1 exception they have a central perforation. A single square specimen (type X3b111) is provided with 2 perforations. Two specimens of type X2b were also included in the lot, square with rounded corners, but with a small "lip" of shell adhering to the concave surface at one end.

Beardsley (1948: 12) states that one of the characteristic bead types of the Middle horizon is a rounded rectangular type made from the shell of *Olivella biplicata*. In *Californian Shell Artifacts* (Gifford 1947: 97), a rounded rectangular Olivella bead which is classified as type X3c has been tentatively identified here as being the same as 3b2. If this assumption is correct, then X3c is a Middle horizon form. The beads with Burial 9 seem to fit the description of type X3c (3b2) and therefore have tentatively been identified as of Middle horizon type.

Burial 12: with this infant skeleton were 227 rectangular and square Olivella beads with both types having a central perforation. The size ranges and hole diameters follow: rectangular, 4.0 by 5.25 by 4.50 mm. to 5.5 by 8.0 by 6.0 mm.; square, 4.5 by 5.0 by 4.5 mm. to 6.25 by 7.0 by 6.25 mm. The thickness for both is from .5 to 1.0 mm. and the hole diameters range from 1.0 to 2.0 mm. The perforations are conically drilled from the concave side, in most cases, and in a few others the hole has been biconically drilled. 1 specimen has 2 perforations instead of the usual 1, which is conically drilled from the concave side.

Burial 15: in this grave were 196 rectangular *Olivella biplicata* beads with a conically drilled hole at one end, bored from the concave side. Their size varies from 4.5 by 6.9 by 4.5 mm. to 5.0 by 7.5 by 5.5 mm.; thickness is from .75 to 1.0 mm. The hole diameters range between 1 and 2 mm.

Burial 8: 557 Olivella biplicata beads found with this skeleton are identical to those recovered with Burials 7, 12, and 15. They are of X3al category and classed as a Late horizon type. It should be noted that the beads with Burial 12 have a central perforation whereas these found with Burial 8 are perforated at one end, although both are the same type.

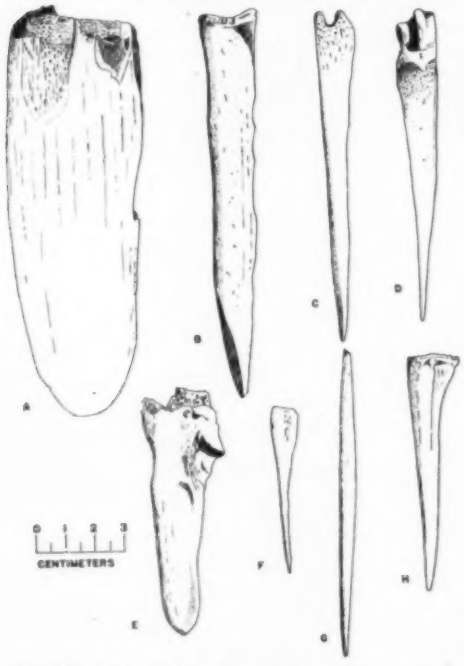

FIG. 27. Artifacts from Site 4 Mrn 20. *A*, antler wedge; *B-D*, *H*, bone awls; *E*, deer-ulna flaker; *F*, bone nose ornament; *G*, gorge fishhook.

One rectangular and 3 triangular *Haliotis rufescens* pendants, conically drilled on the convex side near the flattened end were found with Burial 12 along with 227 Olivella shell neck beads. All 4 pendants have flat edges and lack any modification other than the perforations. The triangular pendants are described by Gifford (1947: 40) as type AF5a111 and Schenck pictures the general form (1926, Pl. 46, *Figs. D, H*). Schenck notes that most of the Emeryville Haliotis ornaments are biconically drilled, whereas all found at Mrn 20 are conically drilled.

A small paddle-shaped bone artifact, 5.5 cm. long and 1 cm. wide, was found lying across the nasal opening of Burial 8 (Fig. 27 *F*).

Two labrets or ear plugs were found (Fig. 26 *E, F*). One is more or less cylindrical, standing about 1.75 cm. high with a diameter of 2.75 cm. The other is concave at one end, extending 3.0 cm. Running at right angles to the large diameter is a shaft 2.25 cm. long.

The only red ocher noted was on Burial 7 where a few small specks were visible.

There was a total of 9 charmstones. Most were fragmentary, either broken accidentally or rejected in manufacture. Two "fish-tailed" specimens were unearthed, but only the basal flare, and adjoining shaft remained (Fig. 26 *D*).

Mortuary Practices. Nineteen burials, all primary inhumations, were exposed during the excavation. The skeletal material was generally in good condition except where disarranged by human or other disturbance. A brief description of each interment follows.

Burial 1: infant, Pit 7, depth 54 inches, tightly flexed, oriented north, no accompanying artifacts.

Burial 2: infant, Pit 8, depth 66 inches, tightly flexed, oriented north, no accompanying artifacts. Burial was directly below a charred log, and slightly stained from water seeping down from log.

Burial 3: infant, Pit 9, depth 31 inches, tightly flexed, oriented east, intrusive into Burial 5. Possible bone implement found over right shoulder.

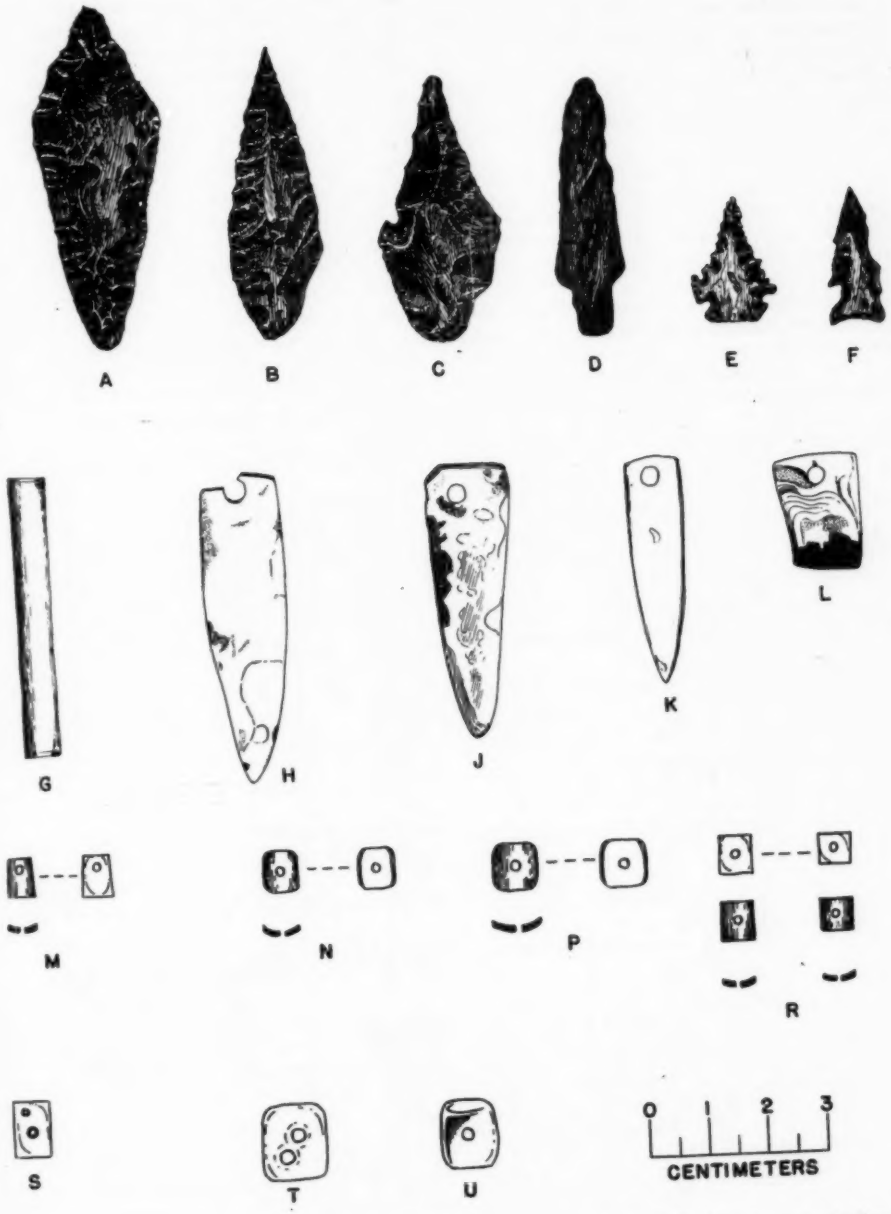

Fig. 28. Artifacts from Site 4 Mrn 20. *A, B,* obsidian blades; *C,* obsidian drill; *D,* waterworn obsidian point; *E, F,* late type obsidian point; *G,* tubular bird bone bead; *H-L,* triangular and rectangular *Haliotis rufescens* pendants; *M,* biconically drilled rectangular *Olivella biplicata* bead; *N-R,* rectangular and square *Olivella biplicata* beads with central perforation; *S, U,* only *Olivella biplicata* specimens found of these types, not to scale. Burials 7 and 8: M. Burial 9: N, P, S, U. Burial 12: H-L, R.

Burial 4: child (4½ years?), Pit 10, depth 42 inches. Found lying dorsally with arms crossed behind back, and legs folded back at knees, oriented northwest. No accompanying artifacts.

Burial 5: adult female, Pit 9, depth 42 inches. Torso, arms, and skull missing. This burial was disturbed by Burial 3. Body lying on right side, oriented west. No accompanying artifacts.

Burial 6: adult female, Pit 11, depth 70 inches. Buried 4 inches below deposit, grave midden filled. Lying on back loosely flexed with wrists crossing at pubic region; legs drawn up to chest and spread with ankles held tightly together; oriented northwest. No accompanying artifacts.

Burial 7: adult male, Pit 15, depth 48 inches. Buried 8 inches below deposit, grave midden filled. Lying on back with wrists crossing at pubic region, legs drawn up to chest with knees wide, and ankles held tightly together; oriented east. With the burial were a few specks of red ocher, a shell (*Polinices lewisii*) about the size of a baseball between the left humerus and chest, and 17 rectangular Olivella beads around the neck, with a rectangular Haliotis bead (3 cm. long) in the center. The Haliotis bead had drilled holes in both ends, while the Olivella specimens had a single perforation at one end.

Burial 8: adult male, Pit 24, depth 69 inches. Buried 7 inches below deposit, grave midden filled. Hands crossing in pubic region, lying on back, knees drawn up to chest with knees and ankles together; oriented east. A bone nose ornament, 557 rectangular Olivella neck beads, and an obsidian point were associated.

Burial 9: adult male, Pit 28, depth 65 inches. Lying on right side facing west; arms, legs, and lower trunk missing. With it were 524 small, rounded rectangular, biconically drilled Olivella neck beads, and a small fragment of baked clay with grass impressions.

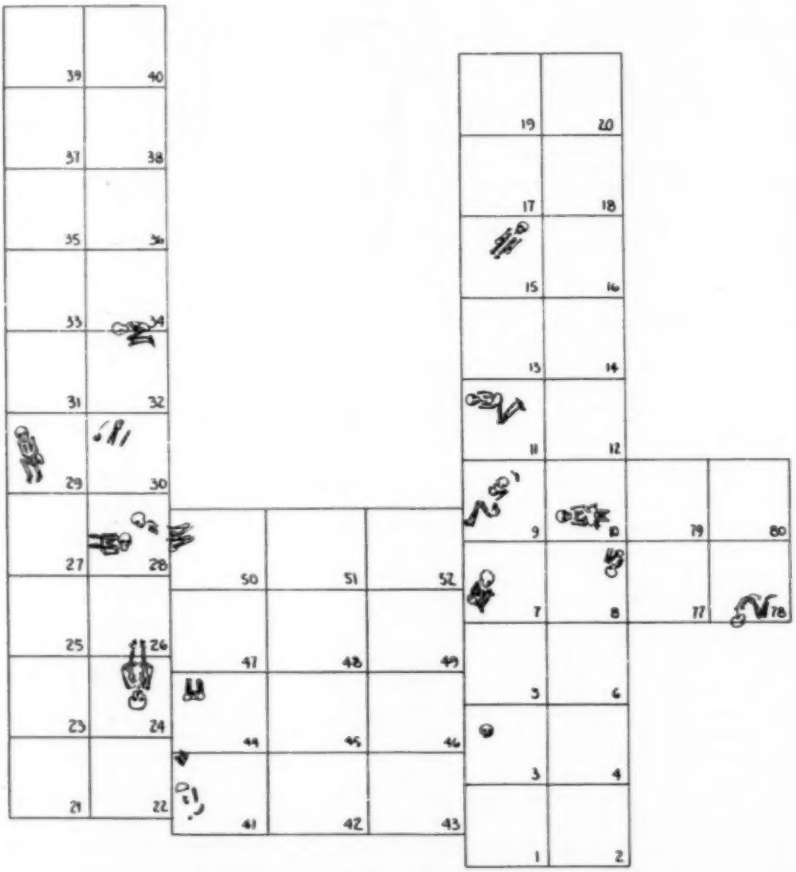

Fig. 29. Horizontal distribution of burials in Site 4 Mrn 20.

Burial 10: adult male, Pit 28, depth 74 inches. Lying in small grave pit dug out of sterile soil and then midden filled. Remains were tightly flexed, with head much lower than hips. The skull was twisted 90° to the left, facing northeast. There were no accompanying artifacts.

Burial 11: badly disturbed adult female, Pit 50, depth 51 inches. Only the pelvis and femora were intact, all other bones missing. No accompanying artifacts.

Burial 12: infant, Pit 34, depth 40 inches. Lying on right side, oriented west, tightly flexed in pure shell lens. 277 rectangular Olivella neck beads conically drilled, 4 Haliotis pendants, triangular and rectangular, and a baked clay fragment were recovered.

Burial 13: badly disturbed adult, Pit 30, depth 34 inches. Right hand and lower right arm were the only remains left intact; all other bones were missing or widely scattered.

Burial 14: adult female, Pit 29, depth 38 inches. Found lying on back, oriented northwest, in semitight flex with both feet missing (old breaks). No accompanying artifacts.

Burial 15: pre-adolescent, Pit 44, depth 50 inches. Found in sitting position, legs folded under hips, facing north. Only the lower jaw, pelvis, and lower extremities were uncovered intact; all other bones missing. A flat, polished bone, 1.5 cm. long, and 196 rectangular Olivella beads, biconically drilled, were with the burial, a few beads still shingled together between the upper legs and near the right knee.

Burial 16: badly disturbed adult, Pit 41, depth 58 inches. Burial was completely scattered. A few segments of a child's skull were found in the same locale.

Burial 17: infant (at least 1 year?), Pit 41, depth 50 inches. The skeleton was completely disarranged by rodent action. No artifacts.

Burial 18: infant, Pit 78, depth 30 inches. Small size of burial and poor condition made position impossible to ascertain. No artifacts.

Burial 19: through an error in field notes no burial was assigned this number.

Burial 20: adult female, Pit 78, depth 51 inches. Found lying loosely flexed facing west, about 9 inches from base. No artifacts.

No special orientation or burial position was practiced by the Mrn 20 inhabitants. Tight and loose flexion were about equally prominent. Burials ranged in depth from 30 inches to 74 inches. Only 5 burials had associated objects.

Food Supply. As the deposit is made up chiefly of shell, it is obvious that the inhabitants used large quantities of shellfish in their daily diet. Net sinkers indicate that fishing with nets was carried on, and a gorge fishhook demonstrates a second method of obtaining fish from the bay. The presence of mortars and pestles indicates at least a partial vegetable diet that probably included acorns and grass seeds gathered locally (Gifford 1951: 237-41).

The inhabitants were also hunters, and the faunal remains of several animals and many species of bird were uncovered. J. Arthur Freed identified the mammal remains and compared them with those recovered from other bay area sites. His findings are given below:

The small collection discussed here was examined by comparison with materials at the Museum of Vertebrate Zoology, University of California. Four genera, *Delphinus* (dolphin), *Phocaena* (porpoise), *Enhydra* (sea otter), and *Odocoileus* (deer), were determined.

The genera are well within known or historical distributions. The number of genera and size of sample probably make comparison with other sites not too meaningful. However, the genera occur not uncommonly in the area around and adjacent to site Mrn 20. Each occurs at sites Ala 307 (West Berkeley) and Son 299 (Bodega Bay). All but *Delphinus* were found at Ala 309 (Emeryville) and CCo 295 (Ellis Landing). *Enhydra* and *Odocoileus* occur at Mrn 232 (Estero), Mrn 242 (Cauley), Mrn 266 (McClure), Mrn 271 (Bear Valley), Mrn 275 (Mendoza), Mrn 307, and Mrn 39 (Belvedere Island). *Odocoileus* alone of the 4 genera in question, occurs at Mrn 115 (Thomas).

Thus an analysis of remains gathered from the midden indicates that the inhabitants' diet included:

1. Fish: remains are not as yet identified.
2. Shellfish
   Bay mussel (*Mytilus edulis*)
   Sea mussel (*Mytilus californianus*)
   Rock scallop (*Hinnites giganteus*)
   Bent-nose clam (*Macoma nasuta*)
   Horse-neck clam (*Schizothaerus nuttallii*)
3. Mammals
   Deer (*Odocoileus*)
   Dolphin (*Delphinus*)
   Porpoise (*Phocaena*)
   Sea otter (*Enhydra*)
4. Birds: see Table 3.

Summary and Conclusions. It is probable that Mrn 20 was not a permanent village site. Examination of identified bird bone reveals that over 50 percent are from species that populate the area only during the fall and winter months. The remainder make this region their home all year long. This would seem to indicate that the populace lived at the site during the periods when winter birds abounded. However, the possibility of some summer occupation cannot be entirely ruled out. The water resources also would suggest a seasonal occupation. Although there appears to be an ample supply from various springs from middle

November through May, the entire Strawberry Point peninsula is dry during the summer months, and the nearest fresh water is several miles northwest at Old Mill Creek, Mill Valley. The meager artifact content may also indicate nonpermanent habitation. Aboriginal populations normally do not take all of their belongings to temporary camps.

The population was obviously small, probably never numbering more than a few families at one time. As a secondary village, or campsite, it probably drew people seasonally from major villages at Belvedere, Alto, and Mill Valley.

Mrn 20 is like other San Francisco Bay area sites in most respects. It has a heavy shell-bearing midden (shell 35.0%; rock 20.8%; residue 40.0%), and is situated near both salt and fresh water, as are other sites in the region. Being an open site, all perishable objects have long since been lost to the elements. The site lacked surface pits, or house depressions, although its neighbor, Mrn 21, has a large surface depression where a sweat house might have once stood.

Although no detailed comparisons will be undertaken here, it is of interest to briefly point out some of the broad similarities and differences between Mrn 20 and other San Francisco Bay region sites. Two large shellmounds, Emeryville (Ala 309, Schenck 1926), and Ellis Landing (CCo 295, Nelson 1910), and 2 smaller ones on the eastern shore, the Stege mounds (CCo 298 and CCo 330, Loud 1924), have been reported upon. Brief notes have also appeared on 2 other shell heaps, the Thomas Site (Mrn 115, Meighan 1953: 1-6), in Marin County at the northern end of the bay, and the San Bruno mound in San Mateo County (Drake 1948: 317-22) on the western side of San Francisco Bay. A comparison of artifacts from these sites with those from Mrn 20 is made in Table 4. The San Bruno mound is omitted from the tabulation because of its meager artifact content.

Of the artifacts recovered at Mrn 20, there are at least 15 distinctive types, and of these, 8 can be utilized in trying to determine the temporal position, that is whether the site falls into the Middle or Late cultural period, as defined by Beardsley for the San Francisco Bay region and Marin coast. The material is arranged below in 3 groups: (1) Middle hori-

TABLE 3. DISTRIBUTION OF BIRD BONES IN SITE 4 MRN 20.
Under habitat the symbol * indicates all-year presence, and ** indicates winter only.

Name	0"-12"	12"-24"	24"-36"	36"-48"	48"-60"	60"-72"	Habitat
Corvus brachyrhynchos				3			*
Corvus corax			1	3			*
Anser albifrons				1			**
Pelicanus				1			*
Uria			1	1			*
Catoptrophorus				2			**
Phalacrocorax auritus	1			3		1	*
Totanus melanoleucus			1				*
Elanus leucurus			1				*
Gavia stellata			3	3			**
Clangula				1	1		**
Mareca americana				1			**
Aechmophorus occidentalis				1		1	*
Nyroca americanus			1	1			**
Nyroca affinis			1				**
Oidemia deglandis	1		1	1			**
Numenius americanus				1			**
Oidemia perspicillata		1	1				**
Branta canadensis				1	1		**
Larinae					1		*
Limosa fedoa					1		*
Eriomatura jamaicensis				1			**
Buteo lineatus				1			*
Total	2	1	11	27	4	2	47
Percent	4%	2%	24%	57%	9%	4%	100%

TABLE 4. COMPARISON OF ARTIFACTS FROM SITE 4 MRN 20 WITH THOSE OF OTHER BAY AREA SHELLMOUNDS.

4 Mrn 20	Emeryville	Ellis Landing	Stege Mounds	Thomas
Abrading Stone				
Sandstone	x	x	x	
Awls				
cannon	x	x	x	x
split long bone	x	x	x	x
Beads				
rounded rectangular Olivella				
small rectangular Olivella	x			
small tubular bird bone	x	x	x	x
Burials				
loose flex	x	x	?	
tight flex	x	x	?	
Charmstones				
fishtail	x	x	?	
pyriform	x	x	?	
miscellaneous	x	x	x	x
Fish hooks				
gorge type	x	x	?	
Flakers				
miscellaneous	x	x	x	x
Labrets				
cylindrical steatite	x	x	?	
hat shaped steatite				
Mortars				
irregular shaped	x	x	x	
rounded	x	x	x	
Pestles				
short cylindrical	x	x	x	
Points and Blades				
obsidian blade, leaf shaped	x	x	?	x
arrow points, small	x	x	?	
Net Sinkers				
grooved		x	x	
notched		?	x	
Wedges				
antler	x	x	?	x
Pendants of Shell				
triangular Haliotis rufescens	x		?	
rectangular Haliotis rufescens	x		?	
Pendants of Stone				
oval shaped, grooved-steatite				

zon characteristics, (2) Late horizon characteristics, and (3) both Middle and Late characteristics.

Middle Horizon

Fish-tail charmstones
Pyriform (pear-shaped) charmstones
Small rounded rectangular Olivella beads
Grooved and notched net sinkers
Loose body flex in 6 burials
Cylindrical steatite labrets

Late Horizon

Small rectangular Olivella beads, shingled
Small obsidian arrowpoints, not serrated
Tight flex in 8 burials

Both Middle and Late Horizon

Basket awls
Gorge fishhooks
Choppers
Leaf-shaped obsidian blades with tapering base

The occupational horizon seems to narrow down to 2 possibilities: (1) a transition from Middle to Late horizon, Phase 1, and (2) Late horizon Phase 1. Late Phase 2 can be discounted because of the lack of cremations, clamshell disc beads, sharp serration on points, and other traits common to this period. The site falls most easily into a transition period between Middle horizon and Late horizon, with very light occupation in the Late, Phase 1, horizon. A more precise assignment to one of the facies defined by Beardsley is not possible because of insufficient diagnostic material.

Since the dividing line between Middle and Late horizons is placed, generally speaking, at A.D. 1000, and since A.D. 1600 is known to be Late Phase 2 in other Marin County sites, it can be estimated roughly that the time of habitation for the site was between A.D. 900 and A.D. 1500, thus making the deposit at least 450 years old, and at most, 1050 years of age.

Grateful appreciation is extended to Clement W. Meighan and William J. Wallace, who generously helped us prepare this report; to E. W. Gifford and the University of California Museum of Anthropology for allowing us the facilities of the museum and the Emeryville shellmound collection; to J. Arthur Freed, who identified the mammal remains; to Richard Brooks, who did the soil sample; to Donald F. McGeein, who added data sections on postholes and bead typology; and to Sharon Atwood who typed the finished copy.

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SAN LEANDRO, CALIF.
April, 1954

THE SECOND SHEGUIANDAH EXPEDITION, MANITOULIN ISLAND, ONTARIO

THOMAS E. LEE

IN THE SUMMER of 1953, archaeological investigations were again carried out by the National Museum of Canada on the early Sheguiandah site, Manitoulin Island. Previous work (Lee 1954a) showed that the hilltop had been occupied by at least 4 successive cultures. These were represented by: (1) a thin surface scattering of what is probably Point Peninsula; (2) a prolific level of materials closely related to George Lake 1 (Greenman 1943); (3) a thin level producing early projectile points; (4) a level of large blades not identified culturally. A number of problems demanded further examination. Insufficient charcoal had been found for radiocarbon dating. Professional archaeological and geological opinions on the dates had ranged so widely as to be almost useless. Two of the 4 cultural levels remained unexplained and the presence of another was suspected. The level of projectile points was too thinly represented. No bones had been found, although part of the site was regarded as a habitation area.

Meanwhile, a great deal of public interest in the site had been aroused; this led directly to the enactment of protective legislation for archaeological sites in Ontario, which had been urged by archaeologists here for more than 50 years (Legislative Bill 66, 1953). The National Museum donated small collections of Sheguiandah artifacts in 1952 and 1953 to several Canadian and American institutions.

With a crew of 15, including several members of the Ontario Archaeological Society, work was continued from July 1 through August 31. Greatest returns were expected from the habitation area and efforts were concentrated there. Again 10-foot squares were laid out. In the preceding year, squares 7-1 and 7-2 were merely started; these were now carried to completion. New squares, 7-7 and 7-8, were excavated nearby. Vertical and horizontal positions of all specimens were noted; graphs were prepared at frequent intervals to show the positions of quartzite flakes and other materials in each square. Considerable surface collecting was performed — a necessity in view of the visits of more than a thousand tourists within 2 months (Kennedy 1953). Toward the end of the season very dry weather permitted preliminary exploration of a small swamp hole near the hilltop and one trench was cut into it.

Square 7-1 produced a greater variety in both materials and forms than was seen elsewhere. Several flint types appeared, in addition to the gray chert occurring locally. Two polyhedral cores were found — the first to appear on the site. Two notched projectile points were found; one was of clear quartz crystal (Fig. 30, *1*) at 4 inches below the surface; the other (Fig. 30, *7*) was of quartzite, at 10 inches below the surface, in association with a little charcoal, and it was almost certainly at the bottom of a shallow pit. Near the surface was a small chipped slate blade (Fig. 32, *16*). General appearances indicated tree disturbance in this square. When broken blades were fitted together, evidence of such disturbance to a depth of 7 inches was provided. As in the past, no pit outlines were visible. Only the careful noting of chip and artifact occurrences on graphs, level by level, provides proof that some shallow pits existed in this square.

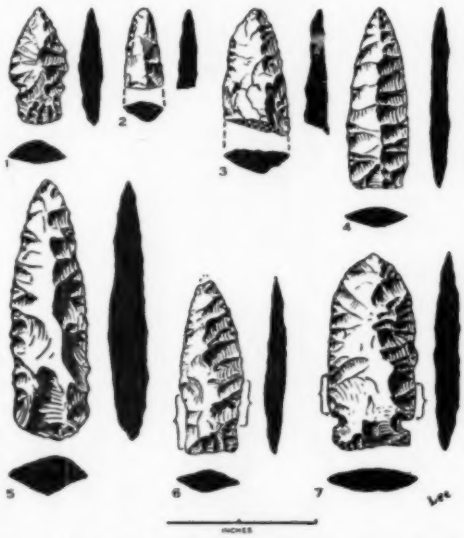

FIG. 30. Sheguiandah projectile points. All are quartzite except *1*, which is clear quartz crystal and completely worked on both sides. All may fall within Early and Late Archaic. Brackets indicate heavy edge grinding. 5 may be a reject.

Although a few boulders protruded above the surface here, they began to take prominence at a depth of 10 inches, increasing in numbers to the maximum cultural level of 20 inches. Scattered thinly through this heavy till-like deposit of boulders, gravel, clay, and sand were flakes of quartzite and an occasional artifact. It is difficult to see how the lower specimens could have arrived here through any activity of man. Half of the square was dug to an additional depth of 6 inches, but no further cultural traces were seen.

Square 7-2 presented a quite different picture. Very heavy concentrations of quartzite chips and blocks persisted from the surface to 10 inches, particularly in the eastern half. Doubtless this fact has to do with the presence of a quartzite outcrop in the southeast corner of the square, the jagged surfaces of which show quarrying and bulbs of percussion from the hammer blows. Probably some digging took place around the quarry. The earth thrown out may account for the considerable central mounding observed in square 7-1, immediately to the west. Later workings probably filled the holes with litter and rubble. The fitting together of broken artifacts shows that considerable disturbances reached to a depth of 14 inches in 7-2. Chip distribution charts show clearly that several pits existed, including one which extended from 5 to 17 inches below the surface.

The square produced a projectile point and part of another, in addition to several fine small blades. The base of a flint drill (Fig. 32, 2) was found at the surface; its fine point was found at 5 inches depth. There were indications that the point was in situ, rather than the base.

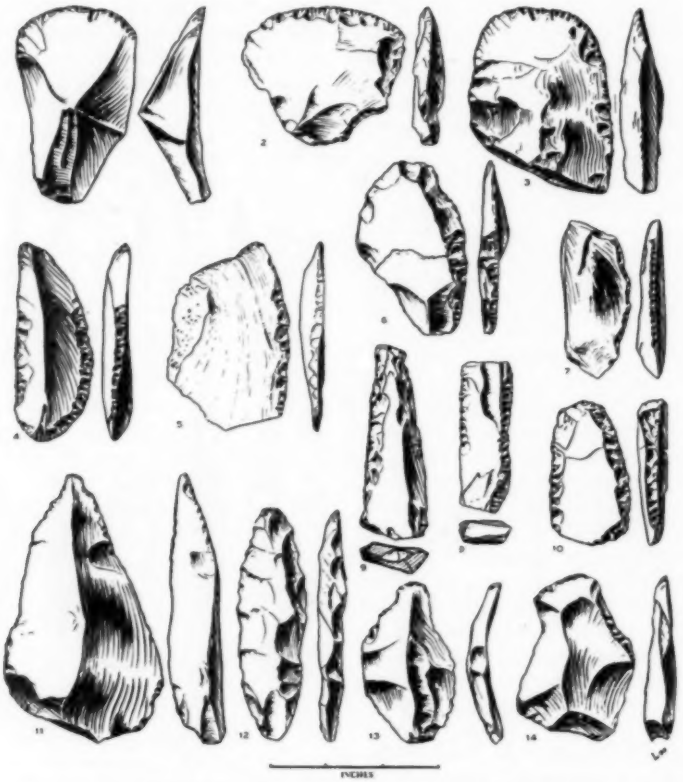

Fig. 31. Sheguiandah Site. Scrapers. All are quartzite except 5, which is slate; 6 and 7 may be merely used flakes; 11 to 14 appear to be specialized scraping tools.

Square 7-7 was opened on the east side of a low quartzite outcrop. The heaviest concentrations of quartzite spalls and blocks encountered thus far in this area were exposed. Probably this was a small dump for the rubble from a quarry between 7-7 and 7-2, although the outcrop face in 7-7 showed only the original glaciated surface. The heavy rubble concentrations were slightly shallower than in previous trenches and 2 projectile points (Fig. 30, *4, 5*) found here were closer to the surface than was the case elsewhere. Similarly, the blades showing secondary chipping appeared at a higher level than usual. These circumstances are possibly related to the fact that the land begins to slope down to the east at this point. Erosion may have reduced it slightly. The point of a flint drill (Fig. 32, *1*) was found under the big blades. It fortunately fitted a drill base found at corresponding depth in 7-5 the preceding year. Some evidence of a little disturbance to the 9-inch level was provided by the fitting of artifact parts, but little proof of pits was obtained. Quartzite flakes, thinly scattered, persisted to a depth of 17 inches, at which point beds of fine gravel and clay began to have an appearance of sorting.

Square 7-8 was placed on the north side of 7-4 to test the possibilities in that direction. The upper level of large blades in humus was found thinner than usual, while the appearance of patches of subsoil near the surface, together with a few specimens normally found between 6 and 9 inches, gave clear indication of considerable tree-fall disturbance. The fitting of parts of artifacts shows disturbance to a

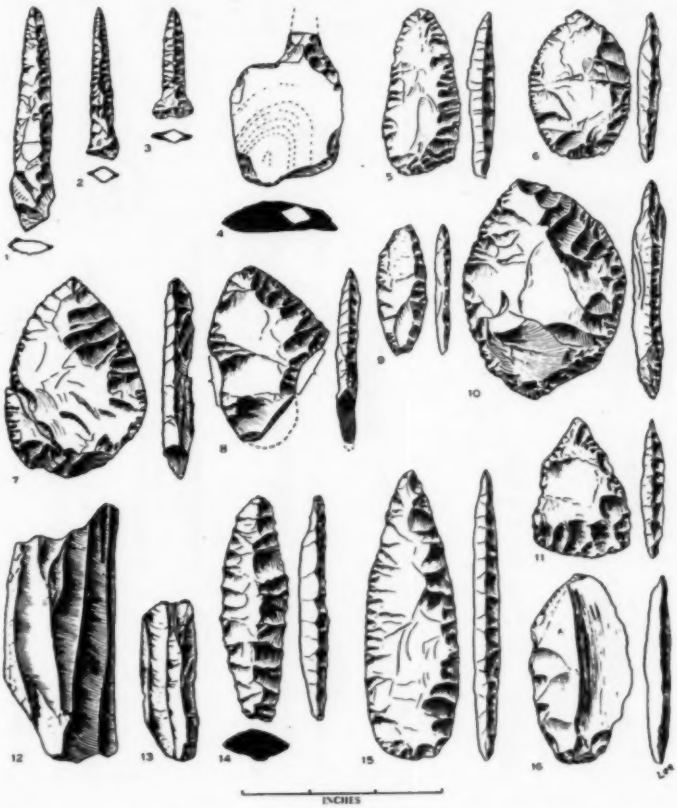

FIG. 32. Sheguiandah Site. Small tools. *1-3*, flint drills; *3* is a surface find; *4*, broken slate drill(?); *5*, quartzite knife; *6*, flint knife; *7*, milky quartz knife; *8*, quartzite knife, notched and smoothed for hafting; *9-11*, quartzite knives; *12*, quartzite polyhedral core; *13*, flint polyhedral core; *14-15*, quartzite tools; *16*, chipped slate blade.

depth of 8 inches, while 2 shallow pits continued to about 12 inches, as shown by chip concentrations. A projectile point (Fig. 30, 6) and part of another were found at the usual 6-inch level, however. Small boulders were present from the surface down, but larger stones up to 2 feet long began to appear at 6 inches. Cultural material thinned out rapidly below 9 inches, represented by only a few scattered flakes below 12 inches, a small crude blade at 13 inches, and a scraper at 18 inches. The blade was in heavy till-like material between 2 large boulders, while the scraper was deep in layers of apparently sorted gravels which began at 15 inches. Careful scrutiny of flakes and specimens in situ at the lower levels provided no explanation for their occurrences other than placement by some natural agency.

Somewhat higher on the hill and about 200 feet nearer the crest is a small swamp hole, about 40 feet wide. It had been conjectured that this reservoir had provided a water supply for the inhabitants of the site (Lee 1953: 61). In line with this view was the probability that artifacts would have been tossed into the water occasionally. Under the heavy growth of swamp grasses might lie beds of peat. If so, it might be possible to obtain information on the age of artifacts underneath by means of pollen analysis. Further, the preservative qualities of peat might provide the skeletal evidence which seems completely lacking in the habitation area.

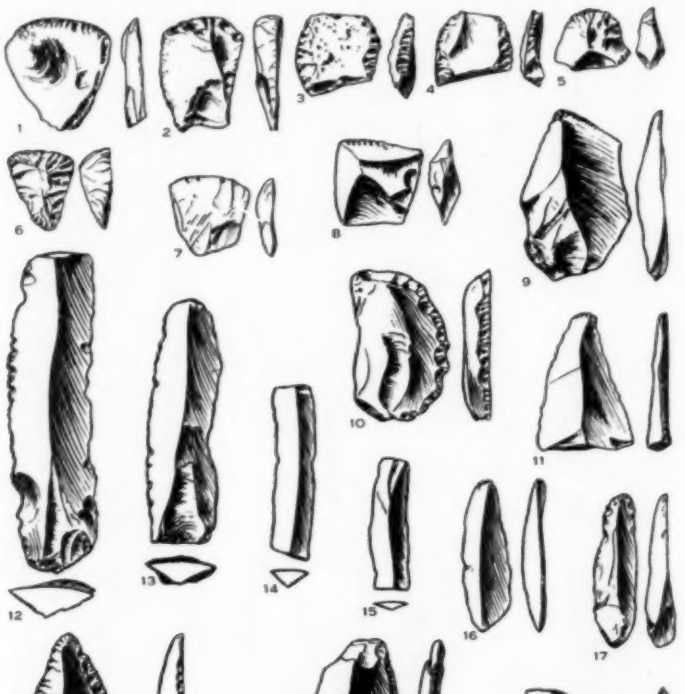

FIG. 33. Sheguiandah Site. Scrapers and flake tools. *1-6*, scrapers; *7-11*, probably used flakes. *12-15*, may have been used; *16-17*, show indications of use; *18-20*, scrapers. *1-6*, flint; *7-20*, quartzite.

A small test trench was cut into the swamp. Under the tough root mass was found laminated black peat to a depth of 12 inches. One artifact and some quartzite chips were discovered, lending weight to the suggestion that specimens probably were tossed in from time to time. At 13 inches, a marked change was observed. A dense form of peat appeared, banded in bright red-brown and yellow. A few artifacts and several chips were obtained from it. At 18 inches the peat ended and a fine gray lake-bottom (?) clay was exposed. Embedded in it or resting upon it were numerous artifacts, chips and blocks of quartzite, and hammerstones. Some of the blade forms were as much as 8 inches long and 5 inches wide. They rested flatly on or in the clay, with no trace of peat under them. This was true for the hammers and quarry blocks. Two broken pressure-flaked blades were found at 19 inches, completely embedded in the clay. At 23 inches, clusters of angular gravel appeared in the clay. At 25 inches, the clay rested directly upon soft, laminated schist in contact with quartzite outcroppings. Some of the quartzite surfaces appear to have been quarried.

It was at once questioned whether the artifacts might have been tossed in after the peat formed, sinking through the water-soaked beds. Strong evidence shows that such was not the case. Large thin blades were lying in flat positions on or in the clay. Even if they could have settled through the peat, surely a little peat would have been carried along under them, especially where the under surfaces were irregular and jagged. Care was exercised in removing each specimen, but no peat was found under them. A blade settling through banded peat would certainly disturb the layers, but no disturbance was observed. Indeed, wherever a thick specimen projected well above clay, the bands of peat rose over it to conform with its shape, as is clearly shown in profile photographs. The case is even better, of course, for the specimens found entirely embedded in clay. It seems significant that they retain their original clear light color, whereas every specimen from the clay surface or out of the brown peat is deeply stained. The single artifact and the chips from the black peat are not stained and probably have not been in place for any great length of time.

No bones of any kind were encountered, but an occasional bit of charcoal was found. Emphasis will be placed upon examination of the swamp in the next season.

The season's work has produced supporting evidence for the sequence of cultures indicated by the findings of 1952. The presence of a fifth and oldest level is now recognized, although insufficient materials are available for its cultural identification. If, as is believed, the materials of this level were tumbled there with gravels and boulders by some natural force, then in all probability a great deal of excavation would be required to obtain distinctive specimens for identification.

The projectile point level is better represented now, as each square produces one or 2 points. Thus far the specimens bear much less resemblance to each other than to some on sites widely spread across North America. Their characteristics, in the opinion of the writer, continue to be early, a view supported by several archaeologists who have examined them or sketches of them. Heavy basal or lateral smoothing again is a prominent feature. Three are of materials foreign to the site: purplish mottled quartzite, dense greenish chert, and clear quartz crystal.

Further samples of charcoal were obtained, but quantities are limited in all reliable situations. The presence of peat in the swamp, overlying specimens, is not likely to be helpful in terms of radiocarbon, because of root penetration.

The existence of pits is now established through careful observation of horizontal positions of all flakes, level by level, but no pit outline has been observed. The possibility of a semisubterranean house earlier proposed (Lee 1954a) has not been proven; unfortunately, almost all of it was excavated in 1952 before its presence was suspected.

Speculations on Age and Cultural Connections. In the continued absence of sufficient charcoal for radiocarbon analysis, no definite date can as yet be assigned to the site. There are numerous indications that, with the exception of the top component, the site is preceramic and very early, however, and these are of considerable interest.

Although a thin sprinkling of material believed to be Point Peninsula (Fig. 32, *3, 16*; Fig. 33, *1-4*) occurs at or near the surface, no pottery whatever has been found.

The second cultural level also occurs at the surface, but in quantity, and extends down-

ward to an average of 4 or 5 inches. This is most nearly like George Lake 1 (Greenman and Stanley 1943), and may in fact be identical (Lee 1954a). The Sheguiandah site, with its many thousands of specimens, of course, has a larger trait list. The same is true for the Giant site (Lee 1954b), which is in many respects more like GL 1 than is Sheguiandah. Early in 1954, E. F. Greenman of the University of Michigan very kindly supplied a collection of 6 specimens from GL 1 to the National Museum of Canada (Fig. 34). It is now possible to compare the quartzite and to note that the GL 1 material is considerably coarser than the Sheguiandah quartzite, which may have some bearing on the relative crudity of most GL 1 artifacts. Despite this, the relations of the GL 1 and Sheguiandah sites have been recognized by Greenman, as he states that "it [Sheguiandah] is apparently another George Lake, and only 25 miles distant" (Greenman 1953: 177). This culture at Sheguiandah, in the opinion of the writer, cannot have the great antiquity formerly indicated for GL 1 (Greenman and Stanley 1943: 528) and its closing date is likely to be considerably less than the 4000 B.C. given by Quimby (1953) for GL 1 or the possible 4000 years indicated by Greenman (1953: 177) for

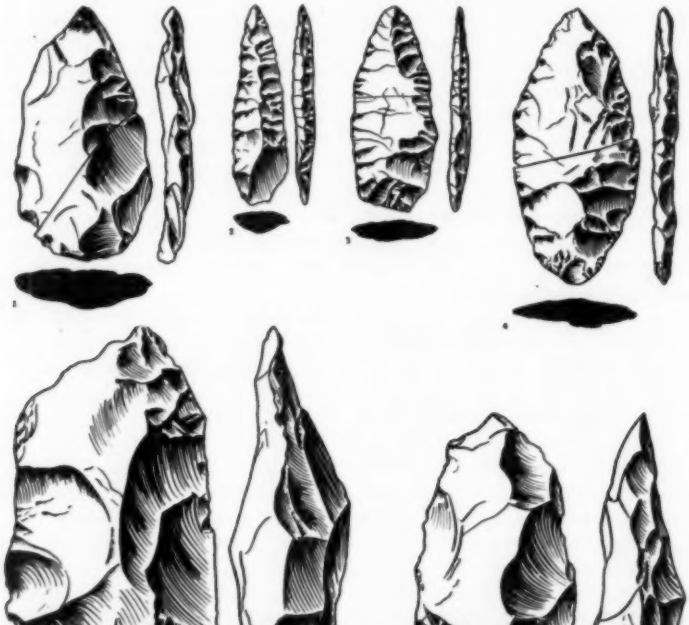

FIG. 34. George Lake 1 specimens in the National Museum of Canada, included for comparison. All are quartzite. All appear to be quarry blanks except 2 and 3; 2 may be an unfinished tool or projectile point; 3 presents features of shape, degree of thinning, and chipping technics which suggest to the writer that it is a finished tool.

a "Yuma" point at George Lake. On the basis of geological time estimates for lake levels, GL 1 has been dated in the belief that its contemporaneity with a 297-foot beach has been established (Greenman and Stanley 1943: 518, 520), because of the presence of supposedly "wave-rolled" artifacts at GL 1. Findings at Sheguiandah include a far greater number of such specimens. During a visit to the Sheguiandah site in 1953, Greenman examined one of these specimens and agreed that it is like his wave-rolled artifacts. As has been shown in another report (Lee 1954a), this explanation for the Sheguiandah specimens was rejected by 7 geologists at the National Museum of Canada.

Let us briefly consider the question of lake levels in their bearing on this cultural component at Sheguiandah. Distributions of the big blades on the hilltop and sides of the hill clearly show that they are in some way related to a well-developed wave-cut notch at 71 feet above Lake Huron's 1952 level. On undisturbed forested slopes such artifacts have been found just above the notch in the midst of chip piles, together with hammerstones and fragments of blades. A heavy bar of well-developed gravels formed along the notch at one stage, joining the island hilltop to another ridge; on top of the gravels were found chip concentrations similar to those occurring over the entire 26-acre site. Such concentrations are believed to be in situ. Below the notch are found neither artifacts nor chips of this culture despite extensive searching by over 60 archaeologists and students in 3 field seasons. It is regarded as significant that the Giant site, most like GL 1 and less than 2 miles away from Sheguiandah, is situated at the 70-foot level and was apparently on the shore of a shallow lake or swamp left by the receding Nipissing waters.

Before examining Sheguiandah or the materials there, George Quimby stated (1953) that "thus the Sheguiandah quarry and workshop dates from a time later than the George Lake sites at nearby Killarney. . . . Moreover, it is possible that the Sheguiandah site, if associated with the Nipissing beach, dates from 1500 B.C. or later." His opinion is evidently based upon the dating of Nipissing levels by radiocarbon methods. This view as expressed by him would place the hilltop under water at any much earlier date. Some major and successive preceramic developments, 2 of which involved quarrying operations of staggering proportions, would thus have taken place in a state of cultural isolation, since some apparently early and middle Point Peninsula sites occur in the near vicinity. Those on Manitoulin Island have not been dated and are not necessarily as old as reported radiocarbon dates for sites in New York State. On the other hand, many authorities have believed that Point Peninsula movements were from northern Ontario into New York — a view which may have to be abandoned or revised. A recent radiocarbon date on one Point Peninsula site assigns to it an age of more than 2000 B.C. This at least suggests that ceramic cultures may have been moving across the Manitoulin area, perhaps into the Bruce Peninsula (Lee 1952: 72), at a time earlier than the maximum date allowed by Quimby for Sheguiandah.

The strongest Nipissing beach occurs at 650 feet A.T., at Sault Ste. Marie and at 630 feet A.T., at Mackinac Island, Michigan (Hough 1953: 87). An interesting date of 3656±640 (Arnold and Libby 1951) is mentioned for a peat sample from a Nipissing beach at Sand Island, Wisconsin. Charcoal from a 596-foot "Nipissing" level at the Burley site (Jury and Jury 1952) is given a date of 2619±220 (Libby 1952: 674, Sample C. 608); in a recent work, Flint (1953: 897) apparently accepts this as Nipissing; however, Hough (1953: 91) shows that a "Toleston" beach at 605 feet, Dalton, Illinois, is really a Nipissing feature and that the 2619±220 date is therefore not Nipissing but applies to the later Algoma stage.

In correspondence, L. J. Chapman, of the Ontario Research Foundation, Toronto, has stated that "the terrace and bluff at the 71-foot level above Georgian Bay, approximately 650′ A.T., is almost surely a Nipissing feature." Therefore its date can be placed tentatively at about 3500 years. It should be noted that a number of geologists are reluctant to accept this, believing that a date of about 5000 years would be more suitable for the notch at 71 feet. Accepting for the moment the contemporaneity of GL 1 and the 297-foot beach, some geologists have also expressed the view that fluctuations in Lake Algonquin would allow near-contemporaneity for GL 1 and Sheguiandah, despite differences in elevation.

Some observations on the still older cultural levels at Sheguiandah may prove of interest. Underlying the big blades are projectile points which have early characteristics. As in previous

excavations, most of them occur at the 6-inch level. Those found in 1953 are illustrated (Fig. 30). Of these, number 7 appears remarkably similar to a Brewerton point (Ritchie 1944: 244, Pl. 115, 37). Some resemblance is also seen to 84 and 91, Plate 110, page 236, in the same work. Unlike these, the Sheguiandah point has heavy lateral smoothing and considerable smoothing on both faces of the blade, facts which may suggest that it is earlier than Brewerton. One other Sheguiandah point, number 1, bears some resemblance to Brewerton, depending on whether the projections below the notch are significant. It is of clear quartz crystal. Somewhat similar points in this material have been found at random across southern Ontario but have not been associated with any culture. Also pointing to Brewerton connections are 2 flint drills (Fig. 32, *1, 2*), which resemble those illustrated by Ritchie (1944: 237, Pl. 111, *30, 31,* 33).

Below the projectile points occur large blades, characterized by secondary chipping, straight rather than wavy edges, and being relatively thin, with one end pointed. No cultural connections have as yet been recognized.

Finally, the presence of a fifth and oldest component must be admitted. To date it is represented by scattered quartzite flakes, some of which bear bulbs of percussion, by a few crude but small blanks or unfinished tools, and by occasional flecks of charcoal. Such items occur in haphazard fashion throughout a deposit of what appears to be typical glacial till, made up of clay, sand, gravel, pebbles, and boulders up to 2 feet in diameter. It is not believed possible by the writer that they could have been placed or thrown there by Indians in the course of camping, hunting, or quarrying. The deposits have a tumbled appearance and no old forest floor can be recognized.

After considerable study on the spot, John Sanford of Wayne University offered the suggestion that the material might represent a very local readvance of the glacier and that the till-like deposits might have been tumbled there by ice. This thought is again expressed by him in recent correspondence (23 March 1954), along with other explanations:

> The unconsolidated materials of the site consist in general of three types of sediments: (1) glacial lake clays, (2) a heterogeneous mixture of soil, pebbles, and boulders of uncertain origin, and (3) small areas of swamp deposits. These are all somewhat erratic in their distribution, and their occurrence is controlled to a great extent by the configuration of the bed rock surface. Where the best development has been seen in the excavations, the glacial-lake clays are overlain by the heterogeneous material with boulders which resembles till. This material contains artifacts throughout its thickness, [Evidence is very slim for the bottom 6 inches, where a little sorting seems to have occurred] although there is a much stronger concentration at the top than there is in the lower portions. This layer is extremely difficult to explain. On examination in the field, it appeared to be ice-deposited material. This would suggest a minor readvance of the ice, at a fairly late date—enough to have disturbed and reworked camp site materials, resulting from occupation of the area since the principal glaciation. This does not seem to be a logical interpretation when the time element is considered. However, the character of the sediments is such that this theory cannot be excluded from the realm of possibility. The only other possibilities which suggest themselves to explain this type of sedimentation might be mud-flow phenomena or transportation and deposition by human agencies in clearing the soil from a quarry site. The mud-flow theory does not seem tenable since the area and sediments involved do not appear to present the proper situation. I do not believe that the students of primitive man would be favorably inclined toward the explanation involving a human agency. The glacial transportation theory seems impossible when considered in the light of time relationships and glacial lake history; however, it seems most probable from the point of view of sedimentation.

If the scattered traces of human handiwork are definitely contained in the till-like material, as is believed by those who carried out the excavations, this could mean that a small camp left by early hunters, situated along the ice front, was destroyed and tumbled forward a short distance by the ice. No such readvance in this area is known to Canadian geologists and it will be necessary to conduct further studies to clear up the point. The possibility of interglacial artifacts is under consideration elsewhere (Anonymous 1953) but at the moment seems inapplicable here, if we have been correct in designating clay deposits under the till as Algonquin in origin (Lee 1954a).

Some geologists, in addition to Sanford, have suggested solifluction as an explanation, but this is difficult to accept, since sharp ridges of quartzite lie squarely across the path of such movement from the higher slopes. Their troughs are not filled as would be expected, and their outlets do not suggest removal of such material by rain wash. Other proposals include ice action on a shore and resubmergence of the site, with floating ice overriding the site, dropping the deposits. Neither explanation appears to fit

the situation as it is known to the writer. Such matters must be cleared up by competent geologists, however; it is expected that at least 3 such authorities will spend some time on the site during the 1954 excavations.

Finally, it would appear that 3 components of the Sheguiandah Site are older than GL 1, which has been called paleo-Indian (Quimby 1953: 4). The Sheguiandah site, with reference only to the relatively late component which is apparently closely related to GL 1, has been mentioned in connection with early-man sites (Roberts 1953: 9). Underlying this component are projectile points, most of which probably fall within Early and Late Archaic. Only 2 of them (Lee 1954a: Fig. 35, *1, 4*) might be considered paleo-Indian, in the opinion of the writer. Possibly a new complex must be defined. However, if the paleo-Indian is represented in the projectile points, and this is certainly open to question at the moment, the 2 lower components may then fall within the same classification.

As for the Sheguiandah component closely resembling GL 1, a long period of occupation and quarrying activity is probably represented, with a closing date in the neighborhood of 3500 years ago, if we accept the Nipissing dates given for the notch. This date would allow for some of the underlying material which, as has been seen, seems related to Brewerton or some similar and perhaps earlier variant of Laurentian.

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NATIONAL MUSEUM OF CANADA
Ottawa, Canada
March, 1954

ALFRED MARSTEN TOZZER – 1877-1954

In the death of Professor Alfred Marsten Tozzer on October 5, 1954, the Peabody Museum and Harvard University suffered an irremediable loss. Although retired from teaching in the Department of Anthropology since 1949, Dr. Tozzer remained in close contact with all the activities of the Museum until a short time before his death. It may be said that Tozzer devoted his entire life as an anthropologist to the service of Harvard, but the Peabody Museum was the particular object of his affection. It is, of course, as teacher, that his enormous influence upon American archaeology and ethnology will be measured; and his own scholarly contributions will be longest remembered; nevertheless it seems appropriate to speak first about the Museum. He was inclined to be a little apologetic about his feelings in this regard, as though they were not quite rational. Certainly there is nothing about this antiquated pile of New England mill construction to inspire feelings of a rational nature. But to Tozzer the collections and the library constituted the Museum and he labored unceasingly to bring them up to the highest possible completeness in the areas of his interest. It was his belief that the resources of the Peabody Museum in Middle American archaeology and ethnology were unexcelled anywhere in the world, but it never occurred to him to mention his own share in bringing this about. In such matters he displayed an unshakable preference for anonymity.

(Continued on next page)

Dr. Tozzer's connection with the Peabody Museum began directly after his graduation from Harvard College in the class of 1900. He was awarded the Winthrop fellowship and made his first field trip that summer and fall with Roland B. Dixon, at that time Assistant in Anthropology, to study Indian languages in California. It is important to note that his initial orientation was toward linguistics and cultural anthropology. In the following summer and fall (1901) he worked in New Mexico, collecting linguistic and ethnological data on the Navahos in the vicinity of Pueblo Bonito. His success may be measured by the fact that he took part in the 9 days' ceremony of the Night Chant, and was permitted to make a copy of one of the sand paintings. A paper on this unique experience, given at the Thirteenth International Congress of Americanists at New York in 1902, is the first of Tozzer's published works.

In December of 1901 Tozzer was appointed as the first traveling fellow of the Archaeological Institute of America and departed immediately for Yucatan. He established himself in one of the native households at the Hacienda at Chichén Itzá, then owned by E. H. Thompson, amateur archaeologist and American Consul, and addressed himself to the task of learning Maya. During the 4 months spent in this manner he made several trips into the surrounding country, endeavoring to make contact with other less acculturated Maya groups. He also spent long hours at the ruins, making paper molds with Thompson, and learning to copy reliefs under the tutelage of Miss Adele Breton, the charming but certainly eccentric British artist, who was working at Chichén at this time. One might surmise from his enthusiastic letters, full of reference to the "wonderful ruins," that the linguist was already beginning to turn archaeologist. There was, however, another and perhaps more powerful force impelling him in that direction. Mr. Charles Pickering Bowditch, the great patron of the Peabody Museum, whose interest in the Maya hieroglyphic system had sustained a continuous program of archaeological investigation in the area since about 1888, was also a member of the Fellowship Committee of the Archaeological Institute. It was Mr. Bowditch's hope that the problem of the hieroglyphs might be solved through contact with some as yet undiscovered Maya-speaking group, in whom memories of their ancient civilization had not been totally extinguished, and it was this quest that largely determined Tozzer's activities during the entire 4 years of his incumbency of the Institute fellowship. The first possibility entertained was that such groups might be found in the region east of Chichén, between there and Tulum, on the east coast of Yucatan. Unfortunately, in 1902 access to this country was barred by a native insurrection then in progress.

In the season of 1903 Tozzer was back again at Chichén with plans for the Tulum expedition, but the project was still hazardous and had to be abandoned. In the meantime a new possibility had offered in the Usumacinta River region to the south. Teobert Maler, German soldier of fortune and undefatigable Central American traveler, had brought back reports of idols and secret rites among the Lacandones of Lake Pethá, who were at that time, and still are, one of the least acculturated Maya-speaking groups in all Middle America. Here, perhaps, was the key that would unlock the mysteries of the ancient monuments. Tozzer accordingly left Chichén in midseason, proceeded to Frontera at the mouth of the Usumacinta, ascended the river by steamer to Santa Margarita above Tenosique, and traveled overland by horseback to Lake Pethá. Here he made contact with a small group of Lacandones, who allowed him to settle down in an unused hut. He was delighted to find that their dialect differed little from the Maya he had learned in Chichén. After a few weeks of carefully cultivated intimacy he was not only able to witness all of their ceremonies, but even took part in some of them himself. He was struck at once by the similarity to the rites described in Landa's *Relacion*. Upon leaving Lake Pethá he was given 2 of the crude pottery *incensarios* around which the rites were centered, so that he might remain in contact with his new religion. One is prompted to observe that, if Tozzer's interest later shifted toward archaeology, it was certainly not due to any lack of talent for ethnographic field work. His letters of this period show the most lively and unaffected interest in everything that transpired in this tiny settlement. They describe warm personal relationships with these remarkably uncultivated people in a style that is unmarred by the slightest trace of condescension.

Dr. Tozzer's field season of 1904 was divided as before between the Usumacinta and Chichén. In the former, he continued to work with the Lake Pethá Lacandones, but visited

other groups as well, in the course of which he made a general survey of the ruins of the Ocosingo district. His work in Yucatan consisted in investigating the more deeply buried ceremonial life in the light of what he had learned from the Lacandones. Comparison of the 2 cultures, closely related linguistically but differing so markedly in degree of acculturation, became the subject of his Ph.D. dissertation, completed in 1904, and subsequently published by the Archaeological Institute of America in 1907 under the title *A Comparative Study of the Maya and Lacandones*.

In the fall of 1904, Tozzer studied at Columbia under Boas and Bandelier and began to work up his linguistic material in preparation for his "Maya Grammar," which appeared in 1921. This was the beginning of a relationship that was to have especial value for Boas at the time of the first World War when, in his own words, "my loyalty to scientific truth was assailed on political grounds." No one who knew Tozzer even slightly will be surprised to hear that he staunchly defended Boas when few other American anthropologists had the courage to do so.

In his fourth and last trip as holder of the Institute fellowship in the season of 1905, Tozzer again went to southern Mexico, ascended the Usumacinta, Lacantun, and Tzendales rivers and visited the scattered Lacandon settlements along their banks. Thus he greatly extended his knowledge of the country and people, and also discovered the important and hitherto unreported Tzendales ruins, but he still failed to find any surviving knowledge of the hieroglyphic writing and the calendar. On his return journey he visited the Tzeltal, Chol, and Chintal groups for the purpose of collecting comparative linguistic material on these little-known Maya dialects.

Back in Cambridge in the fall of 1905, Tozzer offered for the first time his famous Maya seminar, Anthropology 9, which probably propelled more students into Maya archaeology than all other courses that have been given before or since. He was a gifted teacher, one who could dispense prodigious quantities of information at breakneck speed, in a stridency of enthusiasm, passing around masses of drawings, photographs, and specimens the while, and leaving his students at the end of the hour exhausted and more than a little bewildered, but glad to have been there. A minor accomplishment was his ability to put the most surprising amount of bibliography and the whole Maya calendrical system as well, on a 2 by 4 wooden blackboard, in a minuscule but perfectly legible hand.

In the following spring Tozzer made a lecture tour for the Archaeological Institute relating his Central American experiences in 19 of the principal cities between Boston and Chicago. This was a great success and he was asked to do it again the following year, but was obliged to decline under the pressure of other duties. He did, however, make a similar tour later, in 1913. In the summer of 1905 he went to Europe and worked in the Archives of the Indies at Seville.

Next year (1906-7) Tozzer gave Anthropology 1 for the first time and for the next 40 years Harvard undergraduates were seldom without the opportunity of hearing an exciting account of what anthropology is and what anthropologists do. As one of a long corvée of assistants in that course, the writer knows from first hand how seriously he took it and how much of himself was poured into it year after year.

In the summer of 1907, Tozzer, along with Dixon, Kidder, and Morley, took part in a joint expedition of the Peabody Museum and the Archaeological Institute in the Rito de los Frijoles, New Mexico, under the direction of E. L. Hewitt. This collaboration with Hewitt marks the beginning of another cycle of Peabody Museum folklore. Tozzer's personal relationships were invariably characterized by an absolute and clear-cut integrity that resulted in the warmest kind of friendship or, less often, the exact reverse. This Southwestern expedition was, of course, straight archaeology and marks a turning point in Tozzer's career, and in 1909-10 we find him leading the Museum's Central American expedition which mapped the ruins of Tikal, Nakum, and the previously unreported site of Holmul. His assistant, R. E. Merwin, continued investigations at the latter site in the following season, and the results when published a good deal later by George Vaillant were basic to the stratigraphy of Maya archaeology. The summer of 1910 saw him again in Yucatan and in Mexico as representative of Harvard University at the inauguration of the University of Mexico, and the following summer (1911) he was in Mexico again with Clarence Hay making collections for the Museum. In the academic year between these 2 visits he offered his Mexico course, Anthropol-

ogy 10, for the first time. It was in this year that he received his first significant academic honor, Fellowship in the American Academy of Arts and Sciences. In the following year he began his course on primitive society, Anthropology 12, which resulted in the publication of his *Social Origins and Social Continuities* in 1925. In 1913 he was appointed Assistant Professor of Anthropology for 5 years and Curator of Middle American Archaeology and Ethnology in the Peabody Museum without term.

In April of this same year Tozzer married Margaret Castle of Honolulu and from this time on there were frequent trips to Hawaii which became for him a second area of anthropological interest, which was to prove of great usefulness in World War II when he served his country for the second time as Director of the Honolulu Office, Office of Strategic Services, from January, 1943, to July, 1945. His first military service was as Captain in the Air Service from October, 1917, to December, 1918, during which period he presided over Air Service Examining Boards, first in Denver and later in San Francisco. Upon discharge from active service he was commissioned Major in the Reserve Corps for 5 years and recommissioned in 1924 for a similar period.

Getting back to Tozzer's academic and professional history, in the year 1913-1914 he was given leave of absence from Harvard to take the rotating Directorship of the International School of Archaeology and Eth. ology in Mexico for that year. Despite the unsettled political conditions in Mexico at this time — the Tozzers and Clarence Hay arrived in Vera Cruz just in time to obtain a too-intimate view of the shelling of the city by the U.S. Navy — it was a successful season, mostly devoted to excavations at the site of Santiago Ahuitzotla near Mexico City, published as Bulletin 74 of the Bureau of American Ethnology in 1921. This was Tozzer's last field trip in Middle America, though he was to make several more journeys there, the last one in the fall of 1941, when the picture at the head of this article was taken. His last day in the Maya area was spent at Copan with A. V. Kidder and other members of the Carnegie Institution staff on December 7, 1941!

Upon Tozzer's return to Harvard after the first World War, academic honors and responsibilities accumulated at an accelerated pace. Within 3 years he was made Associate Professor, full Professor, and Chairman of the Division of Anthropology. In 1922 he was appointed a member of the Academic Board of Radcliffe College and in 1932 became its Secretary and a member of the Trustees and of the Council of the College. He was chosen as Faculty Representative of the Harvard Alumni Association in 1927, and made a permanent member of the Administrative Board of Harvard College in 1928, an honor and responsibility which he valued very highly and discharged most faithfully until his retirement in 1948. Having taken up a job, of whatever sort, Tozzer had the rare faculty of being able to stay with it year after year without the slightest perceptible abatement of energy or enthusiasm.

In 1928 Tozzer was elected President of the American Anthropological Association, and was re-elected the following year for a second term. He served as A.A.A. representative on both the National Research Council and Social Science Research Council at various times. In 1942 he was elected to the National Academy of Sciences.

In October 1940 Tozzer was the recipient of an honor which pleased him more than he was ever quite willing to admit. A group of his former students, led by George Vaillant, organized a surprise party at the Tavern Club in Boston, at which he was presented with an advance copy of *The Maya and their Neighbors*. This thinly disguised *Festschrift* had been in preparation some 2 years under the code name "Smith Volume." It is hard to say who was the more surprised, the dedicatee, or the promoters of the scheme, who could hardly believe that Tozzer, with his extraordinarily sensitive antennae for picking up intelligence, had not got wind of it. There are those who still maintain that he knew all about it and that his acceptance was one of the finest jobs of acting that had ever been seen at the Tavern Club.

Notwithstanding the increase of academic and professional responsibilities in his later years, added to the full load of teaching, which he never shirked, Tozzer maintained a steady output of important research. It was characteristic of him to concentrate his efforts in major undertakings, hence the comparative brevity of his total bibliography. His annotated translation of *Landa's Relación de las Cosas de Yucatán*, in effect a compendium of all that was known of Maya ethnohistory at the time of writing, will remain the definitive text of this

fundamental source for many years to come. It was likened by one colleague to Eames' never-to-be-completed edition of Monsignor Pirelli's *Antiquities of Nepenthe*. This was perhaps intended to be a good-natured gibe, but was in some respects a sound comparison. Readers of *South Wind* will recognize in the "conscientious annotator" of Douglas' story the same unaffected simplicity and passion for the truth that animated Tozzer throughout his life. A certain blurring and blunting of personality is often attendant upon long-continued accumulation of knowledge and understanding; it is one of the occupational hazards of scholarship. This never happened to Tozzer. To borrow from Douglas again, he "kept his edges intact." This is perhaps only a roundabout way of paying tribute to his personal courage, which was outstanding. He invariably grasped the nettle; was never known to temporize or to back away from a difficult situation. He had a saying: "See a head, hit it." In small matters this meant no more than "Do it now." In larger concerns it meant simply that he was not afraid to commit himself at once and forever. His loyalty, both to friendships and enmities, has become traditional in the Peabody Museum.

At the time of his death, last October, Tozzer had virtually completed a work comparable in scope to his Landa, a massive synthesis of all existing information about the great site of Chichén Itzá. It is a source of great solace to his many bereaved friends to know that he was thus enabled to round off his life's work in Maya archaeology and ethnology at the place where he so happily began it more than 50 years ago.

PHILIP PHILLIPS

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AN AUTHENTIC "PROBLEMATICAL" FROM THE OZARKS

In the spring of 1948 during an archaeological survey of the headwaters of the Lake Norfork Reservoir Area on the North Fork of White River in Ozark County, Missouri, an unusual flint object was found. This artifact, illustrated as Figure 35*A*, was picked up on the surface of a prehistoric Indian village on the left bank of the North Fork of the White River about ¼ mile below Tecumseh, Missouri. The only other object found on this site, other than flint chips, flakes, and spalls, was what appears to be a long slender projectile point, *B* in Figure 35. The owner of the land, since deceased, had picked up a fragment of a full-grooved limestone ax while cultivating the field many years before.

The problematical form appears to have been made from a short, stubby projectile point of quartzite, a stone commonly utilized by the prehistoric Indians of Ozark County. The stem bears close similarity to the slender projectile point illustrated. The unusual artifact shows fair workmanship and all of the flake fractures are of an even color, indicating that the object had not been "reworked" in later years by some idle farmhand. As far as is known, this artifact is one of very few of its type found in the south-central Ozarks region.

FIG. 35.

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A KIVA BELL FROM BANDELIER NATIONAL MONUMENT, NEW MEXICO

The writer recently observed in a private collection an artifact that is of interest because it has been identified as a kiva bell, an object occasionally found archeeologically and still used by the modern Pueblo Indians.

The artifact was found many years ago on the site of Rainbow House, Bandelier National Monument, New Mexico. It resembles a blade, being tapered and rounded on one end, squared on the other, with 2 notches set toward the squared end. It was apparently first percussion chipped and then polished on both sides, without any attempt being made to eliminate all traces of the chipping around the edges. The material is a fine-grained black basalt. It is broken across the middle, but this is reported to have occurred after it was found. The dimensions are: length 24.5 cm., width 8.8 cm., and thickness about 1.3 cm.

The identification was made by a Cochiti Indian who said that there are others similar to it in use at Cochiti today. These are made of various kinds of rock and the best tone is obtained by striking each with a material of the same kind as the bell. They are said to be very old and according to tradition were found at places where lightning had struck. The association of artifacts with thunderbolts is a widespread belief, but usually refers to projectile points.

Further evidence of the ceremonial nature of its use can be seen in the artifact itself. It is too thin and fragile a piece to have withstood any rough utilitarian use and compared with the usual rough workmanship of the Anasazi is too well made to have been intended for any short-lived purpose. There are no signs of use on the edges or surface. The chips missing along the edges are obviously left from the manufacturing process and most are located toward the squared end, which would be the least likely to receive damage in any work done with it.

It differs in form from any other kiva bells which the writer has seen, all of which have been somewhat cylindrical. The artifact it most closely resembles is the *tcamahia* of the San Juan area, which is usually considered merely a "ceremonial object." That the tcamahia served as a kiva bell cannot be shown by an artifact

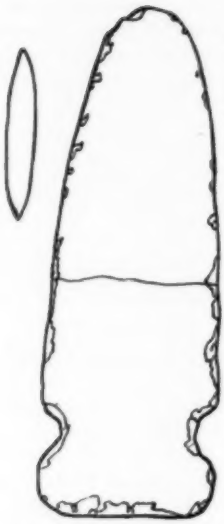

FIG. 36. Kiva bell from Rainbow House, Bandalier National Monument, New Mexico.

so far removed in time and space, and it probably did not. However, it is a possibility worthy of consideration since little is known about either class of artifacts.

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POLLEN ANALYSIS, A RESEARCH TOOL FOR THE STUDY OF CAVE DEPOSITS *

Pollen grains have recently been found in quantities sufficient for statistical analysis in the sediments of Ramanote Cave, Santa Cruz County, Arizona (Arizona: DD:12:1 Amerind Survey System). At the suggestion of Terah L. Smiley of the University of Arizona the samples were collected by Charles C. DiPeso of the Amerind Foundation, Inc., in the summer of 1953. The author is indebted to Edwin B. Kurtz, Jr., and to the Botany Department, College of Agriculture, University of Arizona, for the use of laboratory facilities. Because many cultural materials have been found in cave deposits and many cave explorations are now in progress, this preliminary report is intended to point out the necessity of collecting samples for pollen analysis during the progress of archaeological investigations.

Peat bogs have long been known as ideal deposits for pollen studies due to high pollen frequencies and excellent conditions for preservation. Cave sediments present an entirely different type of deposit and the preservation of the pollen is due to a different set of conditions. The pollen grains from Ramanote Cave are well preserved and have a fairly high frequency (about 200 grains per drop of residue). The good state of preservation is probably due to their complete desiccation in the dry cave deposits. That desiccation is favorable for the preservation of pollen grains is inferred by Wodehouse (1935) who states that the deterioration of air-dried pollen may be prevented by complete desiccation and sealing in airtight containers. It will be most interesting to learn whether cave sediments in more humid climates will also be favorable for the preservation of pollen. The average annual rainfall in the area of Ramanote Cave is about 17 inches. Over 1 m. of sediments accumulated in Ramanote Cave in only 1000 years and high pollen frequencies can probably be expected in most cave sediments.

The sediments of Ramanote Cave, and probably most other caves as well, are composed of siliceous materials and ash. After treatment with acids the residue consisted mainly of organic matter. The pollen grains were further concentrated in the organic residue by the Erdtman acetolysis method (Faergi and Iverson 1950). The Ramanote sediments were highly calcareous and treatment with hydrochloric acid was used before hydrofluoric acid. The following schedule was used for recovering the pollen from the cave material:

1. Place about 2 cc. of material in a small beaker and cover with 10% HCl.
2. Allow to stand until all action stops and then agitate the beaker and decant the fine suspended material into a lusteroid centrifuge tube.
3. Centrifuge, decant supernatant, add 52% HF.
4. Allow to stand for 48 hours with occasional agitation.
5. Centrifuge, decant supernatant, wash with 10% HCl.
6. Transfer to a pyrex centrifuge tube.
7. Centrifuge, decant supernatant, wash with glacial acetic acid.
8. Centrifuge, decant supernatant, add fresh mixture of 9 parts acetic anhydride and 1 part concentrated H_2SO_4.
9. Place in boiling waterbath for 10 minutes.
10. Centrifuge, decant supernatant, wash with glacial acetic acid.
11. Centrifuge, decant supernatant, wash with distilled water.
12. Centrifuge, decant supernatant, wash with 95% ethyl alcohol.
13. Centrifuge, decant supernatant, stain, and mount in glycerine jelly.

Ramanote Cave is located in the Atascosa Mountains, Santa Cruz County, Arizona, at an elevation of about 3400 feet. Seven unconsolidated occupational levels, each averaging 25 to 30 cm. in depth and with a well-defined hard packed floor, were deposited on a travertine

* Contribution Number 2 of the Geochronology-Dendrochronology Program, University of Arizona.

base. Beneath the travertine base is a consolidated level 1 m. thick containing a Pleistocene fauna (horse and camel). Pottery (Hohokam: Santa Cruz phase and Trincheras Purple-on-red) was commonly scattered in the 6th and 7th occupational levels and carried through levels 5 to 1.

Three occupational levels were treated and pollen grains recovered from each level. The 6th occupational level (2nd above travertine base) had the highest pollen frequency and a preliminary study was made of the pollen from this level. *Quercus* comprises about 50 percent of the spectrum and pollen of the families Gramineae, Compositae, and Chenopodiaceae-Amaranthaceae make up most of the remainder of the spectrum. In addition a number of grains are as yet unidentified. One of these commonly occurs as agglutinated masses of from 5 to 30 grains. A number of very large grains that are most probably insect pollinated were also observed in the sample. While it is possible that these grains may have been blown into the cave from a local source, they may also have been brought into the cave on the fur of animals or perhaps by man.

Two grains of *Zea mays* were found in the 6th level. One of these grains was badly wrinkled and the characteristic pore could not be seen. Fortunately the second grain was well formed and shows all the characters of corn pollen. The grain has a diameter of 120u. Allowing for an enlargement from the acetolysis procedure, the pollen grain would still fall within the size range recorded for *Zea mays*. The germ pore has a diameter of 6u and the texture is very fine-granular.

The collection of the samples for pollen analysis was done after the excavation was nearly complete. Due to the unconsolidated nature of the sediments, material from the upper levels may have become incorporated in the sample containing the corn pollen. The unconsolidated nature of many cave sediments is probably their greatest disadvantage. A great deal of dust is generally suspended during excavation and the exposed surfaces of both younger and older levels are subject to contamination. Most of this can be overcome by careful sampling without undue exposure to air or suspended material as each successive level is removed. Previous human occupation or the burrowing of animals may cause an undetectable exchange of materials between levels. For ecological studies several samplings of the same level would probably be the best solution to problems of contamination.

It would seem advisable to collect a suite of samples from all cave excavations in the future. Collections should be made even if the deposits appear most unfavorable for pollen preservation. At least 20 to 30 cc. of sample should be collected at 10-cm. intervals in the stratigraphic column (closer in consolidated material). The samples should be placed in permanent sealed containers and because the pollen may gradually deteriorate when taken from the cave environment, a dehydrating agent such as anhydrous calcium chloride should be placed separately in the container for permanent storage.

Cave sediments present several distinct advantages for pollen analysis over peat- and water-deposited sediments. They are not confined to a postglacial geologic range in glaciated areas, they may offer a continuous stratigraphic sequence up to a modern flora, and problems of rebedding are minimized as the sediments are formed in place.

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THE TECHNIC OF COLLECTING OSTEOLOGICAL MATERIALS*

Occasionally it is desirable to remove archaeological material, such as burials, so that the relationship of the elements, one to another, will be maintained. For about 50 years paleontologists have been employing a technic of enclosing specimens in plaster jackets which, under some circumstances, should prove useful to archaeologists. This method has been fully described in a few publications but, in general, it has been passed along from one academic generation to the next by demonstration and instruction, and new modifications have been presented informally.

It is hoped that the present discussion will prove a satisfactory description of the technic and useful in most of the situations which archaeologists will encounter. Since most of the objects which the archaeologists will want to take out by the technic of casting will occur in unconsolidated material, the procedure discussed here is one most applicable to that type of matrix.

Materials. There are a number of materials, not normally carried by archaeologists, which are necessary for this method.

1. Burlap. A suitable quality of this material can usually be obtained from the local feed store in the form of empty sacks. The more loosely woven sacks are the most satisfactory since they permit the plaster of Paris to thoroughly penetrate the weave. For cutting into strips the sacks should be opened out by ripping the seam or unsewing. After the sack has been opened out there is a nearly square sheet of burlap which is now ready to cut into strips. This can be easily done by one person placing a foot on one edge of the sheet, grasping the opposite edge in one hand, pulling the burlap tight, and with a *sharp* knife cutting along the line of tension. The strips should be about 5 inches

* Published by permission of the Secretary of the Smithsonian Institution. This paper was previously published in slightly extended form with the title "Collecting Osteological Material, or How to Get a Block Plastered," in the *Plains Archeological Conference News Letter*, Vol. 6, No. 1, pp. 3-7, 1953.

wide. For convenience in handling they should be cut at midlength, though a few complete strips should be saved for cross binding the block.

2. Plaster. The most satisfactory plaster for this work is number 1 molding plaster. It is a moderately fast setting plaster but will allow ample time (20 to 30 minutes) for application to the block even when mixed in large quantities. Dental plaster sets too fast for use except in small quantities and gauging plaster (normally used on walls) requires 24 hours to set. There is no rule of thumb for determining the quantity of plaster needed. The estimate must be based on experience, but it is better to mix too much than not enough. The following procedure in mixing has proven to be quite satisfactory in both the laboratory and field. Pour water equal to ⅔ the volume of plaster needed into a pan (*always* add plaster to the water, *never* add water to the plaster), sift in plaster all over the surface of the water as long as the water will take it up; when a little dry plaster remains on the surface it is at the right consistency. *Never* stir the plaster till you are ready to use it; by doing so you speed up the setting about 10 minutes. If a second batch of plaster is needed *always* wash the pan thoroughly before mixing the second batch. Otherwise, when the first batch starts to set it acts as a catalyst and the second batch sets immediately. (Most people have to learn this the hard way.)

3. Gum Arabic (Gum Acacia). This usually comes in crystal or granular form and should be mixed the evening before it is used so that it will have plenty of time to go into solution. Normally it is mixed in the proportion of about ½ pound of gum to a gallon of water. At least a gallon of this solution will be needed for a single burial. This solution is an excellent culture medium for certain yeasts and will spoil in a week or so if a disinfectant is not added. Formaldehyde, phenol, or bichloride of mercury will prevent fermentation.

4. Pan. The most convenient vessel to use in mixing plaster is an enamelware pan, either a wash basin or dish pan. Plaster tends to stick to aluminum and galvanized iron, and vessels of these materials are difficult to clean. Also, a pan is much more satisfactory than a bucket for dipping the strips of burlap.

5. Knife. Even the best of knives will soon be dulled by the harsh fibers of the burlap bag. The type of knife which has proven quite satisfactory is a butcher knife of fairly soft material which can be sharpened with a file.

Uncovering the Specimen. Most people have a tendency to remove too much matrix from the top of the specimen. Best results are obtained by removing only enough matrix to determine the limits of the specimen. Remember that nature, by means of rains and percolating ground water, has packed this specimen much better than you can ever hope to. Above all, *do not* remove the matrix beneath any bone because this will furnish an undercut, and when the jacket is removed the bone will be ripped out of the block.

If the bone is very friable, as it is in most burials, it should be treated with the gum arabic solution. *Do not brush the solution onto the bone* but dip the paint brush into the solution and let it drain onto the area to be treated. Brushing the bone will disturb the small fragments. *Don't be stingy with the gum arabic.* For good preservation the bone should be given all of the solution it will absorb. If the bone is fragmented it should be covered with paper — facial tissues or toilet tissues are quite satisfactory. After the area to be covered has been *thoroughly* saturated with gum arabic, cover with 2 or 3 thicknesses of paper and pat the paper down onto the bone. *Do not brush the paper.*

After the limits of the specimen have been determined, dig a shallow trench 3 or 4 inches deep around it at least 6 inches away from the specimen. Then *saturate* the bone and the matrix between the bones with the gum arabic solution. Except under extremely dry conditions the block should be allowed to dry for 24 hours. If rain threatens it should be covered with newspapers and a tarpaulin.

Preparing Block for Jacketing. After the block has become dry and firm, dig a trench around the specimen keeping the inner wall about 6 inches from the specimen. The trench should be wide enough to stand in comfortably while working on the specimen. The depth of the trench will vary somewhat with the thickness of the specimen and the nature of the matrix, but a convenient rule of thumb is to make the depth of the trench equal to at least half the width of the block. The block must be thick enough so that it will not break in turning.

Next, with a trowel or other hand tool, the block should be trimmed to within 2 or 3 inches of the specimen. This margin protects the portions of the specimen near the edge of the block, both in turning the block and in transporting the specimen back to the laboratory. The sides of the block should be sloped in towards the center from top to bottom; otherwise, the block is apt to fall out of the jacket in turning. The amount the block should be undercut depends on the size and thickness of the block. Usually 4 or 5 inches is sufficient. Don't forget to undercut the block *before* applying the plaster jacket.

After the block has been trimmed and undercut *all* exposed bone should be covered with 2 or 3 layers of the tissue paper in order to prevent the plaster from sticking to the bone. A procedure in papering which is quite rapid and is least inconvenienced by normal winds is to fold a short strip of toilet paper so that there are 2 or 3 thicknesses. Dip one side in water and apply the wet side to the bone. Stipple into place with a dry brush using only the *ends* of the bristles. This moulds the paper to the irregularities of the surface. The surface of the block should be checked for any places where the bone may have been undercut. If any are found, wad up some wet toilet paper and fill the undercuts. Now the block is ready for jacketing.

Jacketing the Block. Presumably when the archaeologist has reached this stage he has equipped himself with

molding plaster, water, pan, and burlap strips. A procedure in dipping the strips in plaster which is rapid and efficient is to take the end of a burlap strip in one hand and dip that end in the plaster. With the other hand hold the strip under the surface of the plaster while the strip is being drawn through the mixture. Remove the excess plaster from the burlap strip with the thumb and forefinger. If too much plaster is left on the strips it makes the jacket too difficult to remove in the laboratory. Many paleontological specimens have been irreparably damaged in removing the jacket in the laboratory because of this. Never fold or wad the strips because this slows up the work about 400 percent. Apply the strip vertically to the side of the block so that it overlaps onto the top. *Do not* draw the strip tight but allow enough slack so that it will mold to the contours of the block. Mold the strip to the irregularities and depressions of the surface of the block with the *ends* of the fingers, not with the palm of the hand. Overlap the next strip for about half its width onto this one and so on all the way around the block. Seal any gaps which occur on the top side of the block. Bind the long strips around the bottom of the vertical strips on the sides of the block, overlapping the ends of the long strips by 6 or 7 inches. If the block is large (5 feet square) apply a second coat to the top at right angles to the first.

This procedure works quite well for 1, 2, or 3 people. A crew of 3 individuals who are used to working together is ideal because one can dip the strips as fast as 2 can apply them. If the block is large and reinforcing is needed, bind small poles (2 inches in diameter) or boards to the top of the block with strips of burlap dipped in plaster.

Allow the plaster *plenty* of time to set before disturbing the block. It will take at least an hour. Usually the small amount of stock feed mixed with the fibers of the sacks retards the setting of the plaster somewhat. Most paleontologists use the thumbnail test to determine if the plaster has set sufficiently to turn the block. If the thumbnail barely makes an impression the block is ready to turn.

After the plaster is thoroughly set the block is ready to turn over. Small blocks can be broken loose with the blow of a pick at the bottom of the trench. With large blocks it is often necessary to drive 2 or more stakes or bars horizontally under the block to loosen it. These are also handy levers in turning the block. Although different matrices have different weights, most of them are a little under or a little over 3000 pounds per cubic yard. This will furnish a convenient figure for estimating the manpower necessary to roll the block over.

After the block has been turned the excess matrix should be removed, both for convenience in handling and for safety of the specimen in transportation. When bone has been encountered in one or two places it is time to stop. The excess jacketing must be cut off and discarded. *Do not* fold down onto the block because it will not make good contact and the specimen may shift inside the jacket. It is not necessary to have the sides and bottom smooth. In fact, irregularities are highly desirable because they will prevent the specimen from shifting inside the jacket and becoming damaged.

Cover any exposed bone with toilet paper in the same manner that the top side was covered. Now the block is ready to be sealed with plaster and burlap. Overlap the strips onto the top jacket 3 or 4 inches. If the block sits overnight, as often happens, the old plaster *must* be thoroughly saturated with water in order to secure a good bond between the old and new. When the bottom seal sets the specimen will be encased in a hard shell which, if properly applied, fits the specimen and the whole thing can stand some pretty severe jolting.

This technic of plaster casting of objects in the field may be applied to a number of archaeological purposes. Burial removal was here used only as an illustration. Fragile basketry or matting may readily be brought to the laboratory in this manner as may any group of small or large artifacts, such as clusters of beads or caches of tools. One outstandingly good use of the casting method is its application to groups of potsherds representing a single vessel in a single findspot. The technic is highly adaptable.

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BOOK REVIEWS

Archeological Survey of Western Utah. JACK R RUDY. University of Utah, Department of Anthropology, Anthropological Papers, No. 12, Salt Lake City, 1953. xi + 182 pp., 62 figs. $2.25.

After a number of fitful starts in archaeology — the Cummings-Judd period and later the Kerr-Steward-Gillin phase — Utah now has a steady, productive research program under Jennings, Smith, Rudy, and others. Rudy's present paper summarizes survey data collected in western Utah since 1949 and collates them with previous research in the area.

Reviewing the general picture some 20 years after being active in this field, I get 3 principal impressions. First, no substantial evidence has been found of cultures or sequences not previously known, but distributions have been filled out and Rudy's careful comparative studies, especially of ceramics, have placed the typology of culture traits on a much more solid basis. Second, Rudy's revision of my earlier hypothesis that there were 4 distinct cultural periods in western Utah — pre-Puebloan hunters, Puebloan farmers, Promontory hunters (in the north), and Shoshonean hunters and gatherers — postulates the continuity throughout all periods of an essentially hunting and gathering people, suggested to be Shoshoneans, who adopted and later abandoned "Puebloid" traits. Third, the fundamental problems of the origins and taxonomy of the different cultures are no better answered than before, since the answers involve other areas.

Evidence of pre-Pueblo cultures is scanty, generally being identifiable through stratigraphic position in caves rather than typological similarities with early materials elsewhere, although projectile points like those of the Gypsum-Pinto and Concho complexes were found. No new evidence seems to bear on my thesis that these cultures lacked basketry for exploiting the seed resources and that the area was probably occupied by a very sparse population of hunters. The early importance of the bison in the Great Basin needs investigation, since abundant remains of buffalo have been found in the north and petroglyphs near Kanab show them in southern Utah. For the very earliest evidence of man, I suggest a survey of the ancient Bonneville shorelines and the river inlets of the later, saline lake periods. Some years ago I found crudely worked flints at several shoreline sites south of Wendover in an area now totally uninhabitable.

Rudy's speculation that the Puebloids were essentially hunters and gatherers, probably Shoshoneans, who adopted Basketmaker and Pueblo traits, first, assumes incredible permanency of a language group, second, postulates inexplicable deculturation after the Puebloid period, and third, entails a rather forced interpretation of the evidence of the Puebloid culture. As for the language, reference should be made to the recent unpublished studies of Sydney Lamb and Morris Swadesh, which corroborate surprisingly well my archaeological and ethnological inference that the 3 languages of the Plateau-Basin branch of Shoshonean were differentiated not over 1,000 years ago, probably in western Nevada, while the Plateau-Basin branch as a whole was differentiated from other branches of Shoshonean perhaps twice as long ago. The spread of Shoshone and Ute-Chemehuevi north and east carried them finally into the area where the Northern Periphery Puebloan cultures had been. The assumption of deculturation of the Puebloid people to a modern Shoshone culture leaves wholly unexplained the loss of many traits not contingent upon a settled existence. Abandonment of permanent houses and farming, for example, would hardly entail discarding one type of pottery for a totally different type. Finally, the evidence of Puebloid nomadism should not be overrated. Like the modern Pueblo, these people doubtless travelled from their villages to utilize wild resources and left pots at campsites. Whether plain slab metates at campsites is evidence of Puebloid nomadism and of Shoshone affiliation seems doubtful. Perhaps these people made or temporarily used such metates, but how the metates are identified as Puebloid is not clear. The scores of metates that I know to have come from unquestioned Puebloid adobe or pit lodges are almost without exception the "Utah" or hollowed platform-and-basin type. The nature of house construction and of villages suggests to me a firm attachment to farm lands rather than the kind of seasonal nomadism recorded among the Basin Shoshoneans and possibly practiced by the earliest Basketmakers. I strongly suggest that the nature of these Puebloid communities will be better understood if a search is made for evidence of irrigation, which I believe was used to some extent and which may have been a critical and diagnostic feature of their cultural ecology.

Rudy seems to recognize a developmental implication in the occurrence only of pit lodges in the Salt Lake region and of rectangular, adobe-wall, multi-room structures farther south (a pit lodge has been found under one of the latter) but suggests dropping my division into developmental Phases I and II and lumping all these sites as a "modified Basket Maker-Pueblo culture in general." Since the former may have been contemporary with the latter, there is no objection to this. But the historical problem remains unsolved. Why are traits that are chronologically separated in the south, for example, Basketmaker figurines and Pueblo corrugated pottery and rectangular rooms, found together here. Obviously, Pueblo traits overtook earlier Basketmaker traits at a place still undisclosed, and the new complex spread northward. Western Utah throws no light on this matter, and I see no reason to change my suggestion that it be sought to the east, perhaps in Colorado.

As to why the Puebloid culture disappeared, the author cites the drought of 1275 to 1299 to support his theory that these people were hunting and gathering Shoshone who reverted to their former mode of life. There are several difficulties in the way of this theory. First, we do not know that the pre-Puebloids were seed gatherers or spoke Shoshone. Second, while rainfall farm-

ers may have succumbed to this drought, the Puebloids very possibly irrigated. In western Utah, the principal sites were along streams flowing from the Wasatch and other high ranges. These streams almost certainly did not dry up and, if irrigation were practiced, a farming population could have survived even though it became reduced in numbers. Third, Rudy, in rejecting my suggestion of "internecine warfare" or possibly invasion, on the grounds that he cannot find evidence, simply ignores what has been published: hilltop forts in eastern Utah, burned houses in the west, and a possibility that the Promontory culture represents Athabaskan invaders. The drought no doubt weakened the societies, but it can hardly be taken as the sole explanation of their disappearance.

I am puzzled that the importance of the highly distinctive Promontory culture appears to have become a victim of the theory that Shoshone hunters and gatherers were in the area throughout all these periods. The pottery is unique, the moccasins are wholly unlike any Shoshonean type but identical with a Canadian style, basketry is unimportant, and the people seem to have been primarily bison hunters and not gatherers. The culture is definitely not "proto-modern" (p. 75) Shoshone. No new evidence has been offered to change my tentative hypothesis of 25 years ago that this culture entered from the north and might represent Athabaskans who moved on into the Southwest before the Shoshone came into Utah.

Rudy would replace the term "Northern Periphery" with "Utah Branch" of Pueblo because he feels that the former suggests marginality and underrates the distinctive features of this culture. Culture area taxonomy, however, is based on the concept of climax, center, typical manifestation or major intensity, and the corollary concept of marginality. If western Utah is properly classifiable with the Anasazi or Pueblo tradition, it is obviously marginal in that it borrowed some but not all diagnostic features from the climax area. Moreover, the Northern Periphery includes a western subtradition that extended over nearly half of Nevada and southern Idaho and at least one and possibly 2 eastern subtraditions that covered the northern portions of eastern Utah and western Colorado.

In order to emphasize the local distinctiveness of western Utah I suggest a different frame of reference. In terms of cross-culturally recurrent types, I would provisionally group the western Utah Puebloid communities as an Incipient Farm culture of the broad type found in early Peru, Mesoamerica, northern Mesopotamia, and elsewhere as well as in the key Anasazi area, and I would then attempt to discover the nature and extent of irrigation. If these communities proved to use irrigation, they would be outstanding among the Anasazi with respect to this crucial but moot point and they would differ from the key Pueblo area in the sociocultural implications of their economy. Moreover, they would throw considerable light upon theories of the origins of irrigation civilizations.

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Basket Maker II Sites Near Durango, Colorado. EARL H. MORRIS AND ROBERT F. BURGH. Carnegie Institution of Washington, Publication 604, Washington, 1954. 135 pp., 117 figs., 10 tables. $4.25 paper, $4.75 cloth.

This important contribution to knowledge of Southwestern prehistory presents information derived from the excavation of a large series of Basketmaker II houses in a village and 2 rock shelters located in the Animas Valley north of Durango, southwestern Colorado. Hitherto, knowledge of Basketmaker II culture has been limited largely to perishable materials and a relatively small number of stone and bone artifacts found in caches or as burial accompaniments in caves. Long ago Morris and Burgh realized that finds of this sort from caves represented only a portion of Basketmaker II culture and that, therefore, information derived from open sites about the rest of the culture — such as the kind of houses the early Basketmakers lived in and the commonplace tools they used — was greatly needed.

Furthermore, at the time these Durango sites were discovered, in the late 1930's, knowledge of Southwestern prehistory had reached the point where data from open sites of Basketmaker II were needed more than ever for comparison with similar data from the early Mogollon and other Southwestern cultures and for the furtherance of the search for a culture ancestral to Basketmaker II. The collections from the Durango sites are extremely valuable as a basis for further investigation along these lines.

The houses and artifacts revealed by these excavations are most adequately described and illustrated by means of numerous drawings and photographs. For example, the taxonomy of the artifacts is clearly depicted in the drawings and at the same time the complete range of individual artifacts is shown by collotype illustrations of a large series of specimens arranged by type. Occupation of the rock shelters and of the house sites in the vicinity is believed to have extended from A.D. 46 into Modified Basketmaker times (6th and 7th centuries), according to a series of dates obtained by the treering method.

The major portion of the publication is given over to descriptions of the excavations and the architectural features. The terms of precise detail in which the excavations are described indicate the meticulous care with which the large and intricate series of overlapping and crosscutting floors and floor features were excavated, and their relationships established. These dwellings were built on a series of terraces excavated from the mountain slope and held by retaining embankments of stone on their lower side. They were single rooms, roughly oval in outline, with saucer-like sunken floors. They had inward sloping walls made of a sort of wood and mud masonry in which short timbers were laid horizontally in mud mortar. The roof was cribbed "after the basic plan used more formally in the construction of kiva roofs in much later times." Characteristic interior features were beehive-shaped mud domes, built up of concentric mud rings — frequently over subfloor cists — and heating pits containing ash, fire-cracked

rocks, and sand. There were also the characteristic slab-lined cists of the classic Basketmakers.

The artifact finds corroborate and add considerably to the early Basketmaker trait list. Such items as notched ribs and scapulae, choppers, end scrapers, and rubbing stones, along with additional forms of manos and metates, go a long way towards rounding out knowledge of Basketmaker culture.

The Durango variant is compared with Classic Basketmaker in some detail and is found to correspond in over 70 percent of the traits. Considering the different nature of the sites investigated and the distance intervening, this appears to be a high degree of similarity.

In a more controversial section Morris takes up the problem of relating the Basketmaker culture to early man. In his opinion the only Southwestern culture which might have a bearing on this problem is the San Pedro stage of the Cochise culture. His reasoning is as follows: The Mogollon culture is generally accepted as having grown out of the Cochise culture (specifically the Penasco phase from the San Pedro stage). Therefore, by showing that both Mogollon and Anasazi are geographical variants grown out of a common preceding culture, then "a tie between the Basket Maker and Cochise stands as a definite possibility" (p. 81).

As evidence for this point of view Morris makes a trait-by-trait comparison of early Mogollon (Penasco, Pine Lawn, and Hilltop phases) with Basketmaker, omitting pottery because it is admittedly later in Basketmaker, and perishable materials because the Tularosa Cave materials were not yet published. Surprisingly enough, he finds that the totality of Basketmaker traits, as contrasted with those of Mogollon, "give to each some flavor of differences and individuality." On the other hand, he also finds too many identities and similarities "to preclude the possibility that both were developed from a single more ancient and more simple culture"; and he suggests that "in the light of present knowledge — or lack of it" the San Pedro stage of the Cochise culture *may have* been that ancestral culture (p. 85).

The reviewer is inclined to be skeptical of trait list comparisons generally unless, as obviously Morris does, they are made with a great deal of caution. For example, frequency of occurrence is as important to Morris as it is to the reviewer. Morris also maintains a proper balance between significant and insignificant details; compares like with like directly and does not equate a trait such as "group burial" with a basketry weaving technic.

Morris' comparison of Mogollon and Anasazi is to be commended also for its careful phrasing of the problem as a genetic one, concerning the relationship of early Mogollon, Basketmaker II, and some earlier culture (*possibly* San Pedro), rather than as a taxonomic one concerning the "root" status of Mogollon or Anasazi. Nevertheless, it seems a loss to knowledge that Morris and Burgh could not have partly followed other lines of approach which they themselves suggest. It would have been most illuminating had they been able to plot the distribution of Basketmaker traits among the Great Basin cultures, as Grange (1952, *Fieldiana: Anth.*, Vol. 40, pp. 331-71) did for the early Mogollon. If their comparison had been broader, it might have occurred to them, as it has to the reviewer, that a number of the elements common to both early Mogollon and Basketmaker, such as certain projectile-point types, are found widely throughout this horizon and are not peculiar to these manifestations. Furthermore, if they had been able to compare the Basketmaker perishables with early Mogollon perishables, they would have found a number of Basketmaker elements (the rigid cradle, feather box, and twined bag, for example) which were not present in early Mogollon, and a larger number of early Mogollon elements (reed cigarettes, juniper-berry skewers, the bow and arrow) not present in Basketmaker culture. These differences, when added to those noted by Morris and Burgh (pottery, the grooved maul, the mortar and pestle, and other Mogollon traits of this horizon lacking in Basketmaker), seem to suggest that regional specialization due to varying external influences, differing rate of development, and differences in environment occurred at a yet earlier horizon than that of the San Pedro stage.

In the reviewer's opinion Morris has accurately estimated the similarity of Mogollon culture with reference to Basketmaker culture, in spite of the fact that his estimate was based on traits from open sites only. There is no denying, then, the possibility that both subcultures may have sprung from a common "Great Basin" ancestor. But from my study of all materials — perishable and nonperishable — of both cultures at this horizon, it is clear to me, at least, that Mogollon culture had acquired by A.D. 100, somehow, through some mechanism, many more new traits than had Basketmaker, so that each stands out, even more distinctly than Morris indicates, as an individual culture.

The main body of the report is followed by 4 very competent appendices which contain more data than average essays of this sort: (1) by Helen Sloan Daniels on the pictographs, (2) by Charles E. Snow and William T. Sanders on the skeletons, (3) by Volney E. Jones and Robert L. Fonner on the plant materials and, (4) by Hugo Rodeck on the animal and bird bones.

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Caves of the Reserve Area. PAUL S. MARTIN, JOHN B. RINALDO, AND ELAINE BLUHM. Fieldiana: Anthropology, Vol. 42, Chicago, 1954. 227 pp., 102 figs., 4 tables. $5.00.

This monograph, eighth in a continuing series describing the archaeology of Pine Lawn Valley and other areas near Reserve, New Mexico, is concerned with the excavation of 4 cave sites. Presentation of the material in this report is in the style characteristic of Martin and his associates.

The report is organized into 7 chapters. Chapter I covers the location and description of the caves and the

methods of excavation, while Chapter 2 details the architecture of the 2 cliff dwellings. The next chapters describe and analyze the pottery, the specimens of stone, bone, and clay, the cordage, sandals, and textiles, and the wooden artifacts deriving from the 4 caves excavated during the 1952 season. Chapter 7 is an excellent brief summary of the report. Site descriptions, excavation procedures and methods, discussion, and summary sections are concisely written. Architecture and artifact descriptions are in outline form, profusely illustrated with generally excellent photographs and skillfully drawn figures. Much detailed information is presented in tables and charts. Typography and layout are excellent.

In the order of their presentation, the 4 cave sites are as follows. (1) *Y Canyon Cave*, located in a small canyon near to and draining into the San Augustin Plains about 50 miles east of Reserve. Mixed deposits indicated occupation from Pine Lawn phase through Reserve phase. (2) *Cosper Cliff-Dwelling*, which occupies a small cave in the narrow canyon of Blue River in eastern Arizona some 50 miles west of Reserve, is assigned to Tularosa phase. (3) *Hinkle Park Cliff-Dwelling* is in a small box canyon on a divide between the San Francisco and Blue River drainages, about 30 miles west of Reserve, and represents a transitional Reserve-Tularosa phase. (4) The fourth site, *O Block Cave*, is situated just east of the San Francisco River, approximately 17 miles south of Reserve. It ranges in time from prepottery to Reserve phase.

Unless this order represents the order of excavation, the reason for this sequence of presentation is not clear, since it is neither chronological, geographical, nor by type of site. Organization of the report by geographic grouping and analysis of material from this point of view might have brought out some significant areal variations. However, the data for such a study are incorporated in the charts and tables so that one interested in this or other aspects can work them out.

Although a great amount of material is available in the various tables and charts, it is sometimes difficult to extract and to relate one group of data to another. Sherd counts and analyses by square and level are given for Y Canyon and O Block caves. Only totals are given for the cliff-dwelling sites, but since these represent short, one-phase occupations, this presentation is logical and satisfactory. Phase assignments are given for each site and, where applicable, to each square and level; but in order to correlate sherd counts and phase assignments for O Block Cave, the most important from a sequential point of view, it is necessary to work between Figure 41 and Table 4. From a comparison of these, it is clear that ceramic evidence for phase assignment is in some cases weak and confused (a not uncommon situation in the Southwest). One or 2 discrepancies appear. For example, Kiatuthlanna Black-on-white is listed as intrusive into Three Circle phase (p. 63), but a check of sherd counts from the various caves shows it present only in sites, squares, and levels assigned to Reserve phase (pp. 79, 83, 84) or to mixed levels (pp. 74-6, 85).

In order to strengthen phase assignments derived from pottery analysis, and to check them independently, phases were also assigned on the basis of projectile point and other nonceramic seriations worked out for the area over a period of years, especially from the Tularosa and Cordova Cave data (Martin and others 1952, *Fieldiana: Anthro.*, Vol. 40). The long-term trends for many categories of materials have been worked out by Martin and Rinaldo, and the use of these for phase placement or for correlative dating is an important contribution. Consistent study of such data can greatly improve the general chronological structure of Southwestern archaeology. However, in this report, provenience and distribution of nonceramic artifacts are given only by phase. This may be satisfactory for the single-phase cliff dwellings and for Y Canyon Cave where mixture ruled out phase assignment, but for O Block Cave provenience by square and level would have been preferable. This would have permitted an independent check of the correlation of pottery and other artifacts.

One or two misleading statements occur. Rinaldo's statement in reference to the use of the tools classified as gravers, that "engraving on antler, bone, or stone is lacking among the Mogollon" (p. 139) is incorrect, as reference to the reports on the SU site, Turkey Foot Ridge site, the Mogollon and Harris villages, Bear ruin, and the Jornada branch will show. The reference by Brown (p. 189) to arrows found by Morris in a Basketmaker II site in Canyon del Muerto is also misleading, as only one fragmentary foreshaft was found, this in the body of a woman, suggesting, as Morris points out (1939, *Carnegie Inst. of Wash.*, Publ. No. 519, p. 19), enemy use of the bow rather than local possession.

These criticisms are not serious when viewed against the background of the whole report. Especially to be commended are the rather complete discussions of typology and significant distribution of perishable materials in the sections by Bluhm and James Allison Brown. It is in this area of information that we still have most to learn about the interrelationships between Mogollon, Anasazi, and Hohokam, and this study adds much to our knowledge. It clearly points up some differences in technics and time levels between generally similar traits. Another contribution is the documentation of the time of introduction of grooved axes, arrow-shaft-polishing tools, beveled manos, and triangular side-notched arrowpoints.

Much of the material in this report corroborates the information produced by Tularosa and Cordova caves, but an important segment provides for the first time a detailed modern statement of the perishable culture of Three Circle, Reserve, and early Tularosa phases. Thus, it gives us, in large measure, a fairly full sequence ranging from prepottery times to relatively late times

in one fairly restricted area. The foresight, planning, and perseverance, as well as the full documentation, which have resulted from the work of Martin and his associates in this area should be emulated by other workers in the Southwest.

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Cuzco. *Reconstruction of the Town and Restoration of its Monuments. Report of the UNESCO Mission of 1951.* GEORGE KUBLER. UNESCO, Museums and Monuments, 3, Paris, 1952. 39 pages, frontis., 59 figs. on 16 pls., 5 maps. $1.50.

The city of Cuzco, Peru, was severely damaged by earthquake on May 21, 1950 (see *Am. Antiq.*, Vol. 16, No. 4, 1951, pp. 367-8). Since the whole city is a treasure house of Inca and Spanish Colonial architecture the tragedy was keenly felt by archaeologists and historians of art, and conflicting programs for reconstruction and future city planning were presented to the Peruvian authorities by many interested groups. There were, in addition, few Peruvians trained in the conservation of old buildings. The government therefore turned to UNESCO and asked it to send a technical commission to report on the earthquake damage and advise about what should be done. UNESCO complied, sending out its first technical mission of this sort under the direction of Professor George Kubler of the Department of History of Art at Yale University. Kubler was especially well qualified for the task because of his long interest in American archaeology and his acknowledged position as one of the leading figures in the field of Latin American colonial architecture. The UNESCO mission spent some 2 months in Cuzco in the summer of 1951 making a complete survey of the ruined city, and its director has produced a report of extraordinary value. It is an example of the best sort of "applied archaeology" and as such has rather general theoretical interest, as Jennings pointed out in a note on page 108 of the July, 1953, issue of this journal (Vol. 19, No. 1).

Many old cities are products of gradual growth. Some gradual growth has, of course, taken place in Cuzco's history also, but because of a series of historical accidents most of the city's artistic monuments belong to only two brief periods in its history. The Incas rebuilt it completely between 1438 and 1534. The Inca city was then burned in 1536, during the Spanish conquest, and rebuilt under Spanish direction. In 1650 the colonial city was so severely damaged by earthquake that it was found necessary to rebuild most of the public buildings. The churches and many private mansions were rebuilt between 1650 and 1732 on a more sumptuous scale than before. In the 18th and 19th centuries, Cuzco declined in wealth and population and little new construction was undertaken. Some whole quarters, indeed, were allowed to fall into ruins. The city's commerce revived with the approach of the railroad, early in the present century, and there was much new construction in the period 1920-1950 including remodelling of many colonial houses. The problem facing the UNESCO commission was to make recommendations for repairs and future building that would preserve as much as possible of the surviving Inca and colonial buildings without cramping too severely the city's modern growth. The amount of earthquake damage, the historical and artistic value of the building, and the desires of the present owners all had to be taken into account in handling each particular case.

The Inca city is represented most obviously by abundant remains of masonry walls and doorways in the Inca style, the distribution of which is shown in Map 3. No complete Inca building is standing, although a number of the colonial buildings incorporate substantial fragments of Inca palaces. The Inca masonry walls suffered relatively little damage in the earthquake and are in little danger of destruction in programs of civic improvement since they are protected by law as archaeological monuments. As Kubler recognizes (p. 19), not all of the Inca-style masonry is preconquest in date; there were both remodeling of Inca stone work and wholly new construction in Inca style carried out by Inca workmen under Spanish direction in the century after the conquest. No one has made a systematic attempt to sort out this later work from the preconquest remains.

There is one important problem relating to the Inca city which Kubler does not discuss and which is being ignored by the Peruvian authorities, to the great detriment of archaeology. Most of the Inca buildings were built only partly of stone, this material being preferred for doorways, corners, and wall foundations. The upper walls were normally of adobe, just as in the colonial buildings. Inca-style adobes are differently proportioned from colonial ones and just as easy to recognize as the characteristic stone building blocks. Inca adobe walls deserve the same protection the stone walls get, but in actual practice they are ignored by the authorities and torn down with impunity by their owners during remodelling operations. Many are sure to be lost during the present reconstruction work.

The greater part of Kubler's report deals with colonial Cuzco and is full of new information on construction methods, style, and dating. Of special value is the reproduction in the frontispiece of the Monroy Panorama, a contemporary painting of the 1650 earthquake which gives a good idea of the appearance of the central part of the city before the great building period of 1650-1732. It can be used to suggest chronological limits for the date of construction of many colonial buildings which are not specifically mentioned in historical records.

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Les Techniques de Protection des Biens Culturels en Cas de Conflit Armé. HENRI LAVACHERY AND A. NOBLECOURT. UNESCO, Musees et Monuments, 8, Paris, 1954. 222 pp., 116 illus. $5.50, 30 shillings, or 1500 francs.

Museum administrators, curators, and technicians, at present, and most archaeologists, sooner or later, will be concerned with this important handbook. It is the most up-to-date and complete publication of its kind to treat of the problem of safeguarding in time of war all cultural property which may be defined as monuments and structures of artistic, historic, or archaeological significance, works of art, documents, books, and objects of archaeological and scientific value. Two well-known European experts, Henry Lavachery, Honorary Chief Curator of the Belgian Royal Museums of Art and History, and André Noblecourt, Technical Advisor of the Security Service of French Museums, were appointed by the International Committee for Monuments, Art, Historical, and Archeological Sites to prepare this volume. The manual is the eighth in a series on Museums and Monuments so far published by this UNESCO committee.

In a practical and thorough manner the authors discuss the direct and indirect risks to which cultural property is subject during war, stressing the fact that in many cases fire is the most serious menace. Types of atomic destruction and ways to minimize their effects are given. A major portion of the treatise is devoted to the technicalities involved in the physical protection of all types of cultural property. For purposes of convenience all such material is divided into that which is immovable and that which can be transported. The former comprise monuments, structures of all kinds including museum buildings, and archaeological sites. Interestingly enough, much can be done to minimize the risk of their destruction or damage. Of particular interest to museum personnel, however, is the section on transportable objects. In the case of these, the problem is approached, first, from the point of view of measures to reduce their vulnerability, wherever they may be, by overcoming such dangers as fire, extremes of temperature, attacks of mold and insects, vibration, and other hazards. Next, one finds that protection in especially constructed shelters, either of concrete above ground or of a subterranean type, constitutes one of the most practical solutions. In this section a great many detailed plans and illustrations supplement the text and depict already-existing shelters in Belgium, Great Britain, Holland, and the United States.

In times of tension such as these it is wholly realistic to think of what we can do to preserve the treasures of our museums, universities, libraries, and research institutions in time of atomic or other type of attack. Although there was some destruction of cultural property in Europe and in a few other areas of the globe during the 6 years of World War II, thanks to careful planning and effective preservation losses were much less than they might have been. Emphasis is put on preparation during peace for the devastations of war. Much of the benefit of the experiences of the war years in saving our cultural heritage has been summarized in this manual and the rich selection of 116 photographic illustrations at the end of the book are a visual demonstration of good practices.

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Indian Corn in Old America. PAUL WEATHERWAX. The Macmillan Company, New York, 1954. vii + 253 pp., 75 figs., 3 color pls. $7.50.

This book is a history of maize and of its relationship to the American Indian, as well as a treatise on certain botanical problems of maize. The writing is clear, sometimes eloquent, and the work is profusely illustrated. The book is printed in rather large, legible type on large octavo pages.

Historical sources include pre-Columbian codices, as well as old European chronicles, from both of which illustrations of maize and maize deities are reproduced. Interesting quotations are translated into English. The story is developed with photographs and drawings of archaeological remains and of relic Indian cultures of today. The scope of the story covers the discovery of maize by Columbus, its introduction and reception in Europe and assimilation into the new American civilization, the culture and utilization of maize for foods and drinks, and the customs and artistic expressions which developed around its use.

The author, who has devoted his professional life to a study of Indian corn, emphasizes the importance of maize in the anthropological story of the Indian. He writes that "inasmuch as the main food staple of the most progressive Indian races was maize, and all social classes, even to the nobles and kings, had at least a token role in producing it, each individual lived in close contact with the plant. Watching its development day by day, from planting to maturity, and then its conversion into useful commodities, he came to feel that it was more to him than food for his physical body. It fed his body, but it also stirred his imagination and fed his hungry spirit. On his daily habits and thoughts, his literature, his arts, and his religious practices it left a deeper imprint than any other factor of his physical environment."

The botanical aspects take up about a quarter of the book and are, in some cases, blended with historical data. At times the discussion here is phrased in technical terms, although, unfortunately, no glossary is provided for the layman. Treatment of the botanical literature is not so complete as on the history of maize. For example, the race concept of maize and the classification of races (Anderson and Cutler; Wellhausen and others) has not been included in the discussions of variation in maize. The race concept is of particular interest to the anthropologist, because the distribution in space and time of archaeological races of maize may be used to help trace the prehistoric migrations of

Indian races. Since morphology has been emphasized in the discussion on the origin of maize and its relatives, it is surprising that certain significant results of Mangelsdorf and Reeves have been omitted. These authors, for example, have found that teosinte is intermediate between *Tripsacum* and maize in a total of at least 55 characters, and they point out that such a situation would probably not occur as a result of divergent evolution. Their work certainly merits full recognition despite the fact that their conclusion is contrary to the opinion of the author of *Indian Corn in Old America*. In this connection, the author does not even mention the extensive biological research of recent years on maize. He does, however, present his own views on many of the problems concerned with such research.

The book should serve a useful purpose in presenting to the general public and scientist alike some of the historical facts about maize which have hitherto not been readily available. Although botanists and anthropologists have known about the extensive historical literature on maize, no one previously has taken the trouble to assemble it. In this respect and because of its many good illustrations, this is a unique and valuable book.

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The Kachina and the White Man. FREDERICK J. DOCKSTADER. Cranbrook Institute of Science, Bulletin 35, Bloomfield Hills, Michigan, 1954. xvii + 185 pp. 33 figs., 16 pls. $5.00.

Despite its somewhat popular title and style, this book is a well-documented analysis of white contacts with the Hopi with special emphasis on evidence of the early nature of the Kachina cult and the later modifications of ritual, masks, and associated paraphernalia. The author feels the evidence for pre-Spanish origin of the Kachina cult and the Kachina mask is conclusive, but he finds the aboriginal origin of the "Kachina doll" far less certain. He discusses exchanges between Hopi and other pueblos, especially Zuni. As might be expected, evidence of change is much more abundant for the last century of white contacts. The final chapter is a brief but sympathetic and intelligent discussion of the role of the Kachina cult in modern Hopi society and its relation to the larger white world.

Archaeologists will find the book intrinsically interesting and of some help in problems of interpretation in southwestern archaeology. However, a more technical publication which gave a systematic and reasonably complete catalog of mask types, paraphernalia, and so on, would be more useful. The author implies he has a good start on such a compilation and it is to be hoped that he will at least make it accessible on microfilm or in some other fashion for the use of southwestern archaeologists confronted with the interpretation of "problematic" objects.

Dockstader gives the impression that he believes the Kachina cult to have been entirely an indigenous development, although he cites a myth suggesting a more southern origin. The particular pattern of the Kachina cult is certainly a local development but many will wish to hold the question of origins open until a really thorough evaluation has been done of the superficially striking similarities between the Kachina cult and the rain cults of central and southern Mexico. Brew, for example, has suggested that the recognizable Kachina cult may be as late as 1300, the period when there is other evidence of influence from central Mexico (see *Proc. of 3rd Round Table of Soc. Mex. de Anthro.*, 1944).

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The Maya Civilization. GEORGE W. BRAINERD. Southwest Museum, Los Angeles, 1954. 93 pp., 25 figs., 2 maps. $2.00.

The material presented in this concise review of Maya culture first appeared in the *Masterkey*, journal of the Southwest Museum. It was originally published in 8 sections which appeared between May, 1953, and August, 1954. Binding these sections together into a single volume has greatly increased the usefulness and readability of the material. Brainerd's booklet probably will contain little that is new for the anthropologist who has kept up with the developments in Mesoamerica. But, for the nonspecialist it is a quickly read, clear, neat, up-to-date summary of the Maya, and it is mainly to this type of reader that the publication is directed.

Following a short introduction concerning the environment of the Maya country and the physical characteristics of the people, Brainerd discusses Maya culture in 4 stages: Formative, Classic, Post Classic, and Post Conquest. As would be expected, greatest attention and the largest amount of space is devoted to the Classic stage. Consideration of that stage is divided into the following topics: architecture, religion, calendrics, ceramics, graphic arts, dress, settlement pattern, social organization, and economy and population.

Presentation of the picture of archaeology outside the Maya area proper is given in a number of instances. In considering the Formative stage, the spread over most of Mesoamerica of a more or less uniform culture basic to many of the later higher achievements is made clear. The homogeneity and uniqueness of Maya culture of the Classic stage is plainly stated, but the interchange of luxury goods, art styles, and systems of reckoning time between the Maya and other contemporary culture centers in Mesoamerica is likewise shown. The great influences of the Toltecs from Tula, just north of the Valley of Mexico, upon the Maya Post Classic stage is summarized.

Brainerd has drawn upon the work of numerous Maya authorities in compiling his volume, and has given some of the earlier concepts of Maya prehistory new interpretations in view of more recent findings.

There is no bibliography, but after each section of the volume additional selected readings are listed. The smallness of the type and page size were distracting to the reviewer.

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The Rise and Fall of Maya Civilization. J. ERIC S. THOMPSON. University of Oklahoma Press, Norman, 1954. xii + 286 pp., 20 figs., 24 pls., 26 decorations, map. $5.00.

Although this book is ostensibly directed to the general reader, it is also a timely one for the anthropologist and comparative historian. In the past any comprehensive study of Maya history has been a hazardous venture, because of the difficulty of correlating the historical legends of the colonial Maya with the archaeological findings. The present study, however, offers convincing evidence that this is now feasible and most of our sources of information can be integrated. The author, besides being the dean of living Maya epigraphers, is a veteran archaeologist and ethnologist, and an authority on the historical sources, both Spanish and Maya.

The book is delightfully written; it has the freshness and literary excellence which have been admired for the past century in the works of Layard and Stephens. The work is full of illuminating comparisons, not only with the parallel achievements of neighboring civilizations, but with analogies in European history, although it is made plain that the Maya developed in isolation from the Old World

The work is essentially a cultural history of the Maya, an account of the peaceful theocracy which presided over their rise, and the warlike lay autocracy, partly of foreign Mexican origin, whose rule accompanied their decline. There is much evidence of these developments in Maya art and architecture, and the many splendid illustrations convince the reader that the author's conclusions are highly objective. For the early growth and florescence of Maya civilization there remain only the artifacts, architecture, and art, but for the period of its decline we also have a certain amount of legendary history. Some of this was narrated to the 16th-century Spaniards, and some has come down to us in colonial Maya manuscripts, written in their own language but in European script.

To make this history understandable Thompson describes the geographical and ecological setting, the living Maya, and many of the more essential features of their former culture. This is effectively done, but never in such a way as to obscure the main thesis, which is historical. Since the author is an eminent epigrapher, it is of special interest to note what he tells us of the import and content of the inscriptions, now that it is almost certain that they contain neither history nor personal eulogies. Although astronomical phenomena and chronological computations are recorded, much of the material seems to consist of sequences of dates and time periods. It has been noted that numbers and time periods were apparently deified, but Thompson has shown, partly from the glyphs themselves and partly from the language and figures of speech in colonial rituals and prophecies, that the Maya were prepossessed by a philosophy of time. They "conceived of the divisions of time as burdens carried through all eternity by relays of divine bearers. These bearers were the numbers by which the different time periods were distinguished. The burdens were carried on the back, the weight supported by tumplines across the forehead . . . Mystically too, the burden came to signify the expected good or ill fortune of the year."

The sequence and length of the various periods of Maya history are those generally accepted by the specialists. It began with a Formative period, probably not greatly differing from that of the neighboring civilizations; but it gave way, perhaps early in the 4th century A.D., to what is known as the Classical period, distinguished by stelae with Maya glyphs, corbeled vaulting, and polychrome pottery. From the 7th nearly to the end of the 9th century was the brilliant florescence of this period, which was followed by the well-known collapse. The author's treatment of this debacle does more to make it understandable than any previous discussion that I have seen. Into this vacuum poured an invasion of foreigners and foreign ideas, the latter certainly stemming from the Toltec city of Tula north of Mexico City. At Chichén Itzá we find a vigorous combination of Toltec and Maya art and architecture; but it was a culture dominated by aggressive military leadership, and the serene spirit of the old Maya civilization had disappeared. About 1200 Chichén Itzá fell in its turn, and after an interval of disorder it was succeeded by a powerful joint government at the walled stone city of Mayapan. Here we find evidence of commercial prosperity, but an astonishing retrogression in art and architecture. Here are the remains of large colonnades, but temples decreased in number and the masonry was very crude. Finally, about 1460, a revolution destroyed this capital, and the land broke up into a number of independent chieftainships, which constantly warred with one another. No new pyramids were now constructed, and when the Spaniards arrived the stone temples had given way to thatched structures.

The book is enlivened by a chapter devoted to sketches of Maya life, which few readers will fail to find of interest. The actual characters are fictitious, but their actions are derived from sound information, and their mentality is that of the modern Maya, among whom the author has spent much time.

The work begins with a prologue, in which problems are posed, past research briefly reviewed, and the Maya area with its people described. Two long chapters cover a history of the rise and decline of Maya civilization, and another its intellectual and artistic achievements. The remaining chapters contain the sketches of Maya life, an account of religion, and a view of "Maya civilization in retrospect." These are followed by a synopsis of Maya history, a list of selected reading, and an excellent

index. Each chapter heading is accompanied by a relevant quotation of a philosophical nature, usually taken from one of the British poets. The book is splendidly illustrated by 63 photographic reproductions, 20 figures containing about 58 line drawings, and 26 decorations drawn from Maya art.

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Exploration of an Adena Mound at Natrium, West Virginia. RALPH S. SOLECKI. Anthropological Papers, No. 40, Bureau of American Ethnology, Bulletin 151, Washington, 1953. Pp. 313-95, Figs. 13-19, Pls. 24-9.

This report, although not appearing in print until 1953, records the beginning of the recent period of intensified archaeological activity in the Upper Ohio Valley region.

Through the cooperation of the Smithsonian Institution, the Pittsburgh Plate Glass Company, and interested West Virginia citizens, the destruction of Natrium Mound in 1948 was made a salvage archaeological operation rather than merely a nonscientific soil-removing action to make way for industrial expansion. Solecki was provided by the company with 4 workmen, power excavation equipment, and 20 days to do the job. Since the work was done in December and January and additional field assistance was limited to the part-time help of 6 volunteer archaeologists, it can be well understood that this job (a complex burial mound, 9.5 feet high and 55 feet in diameter) was not done under the most favorable circumstances.

In spite of the limiting conditions involved, the excavation was done competently, a great deal of valuable information was recovered with a high order of control, and it has been presented in a most satisfactory and usable fashion. After a brief introduction, the report is composed of 6 main sections. First, the mound and excavation procedure are discussed. Results of excavation are described in the next 2 sections under "mound features" and "artifacts." A summary, trait list, and conclusion are the final 3 sections. There is an adequate bibliography and 2 appendices, one on physical analyses of soil samples and minerals and the other on the microstructure of copper artifacts from the mound.

A critical evaluation of this report may be concerned with the following factors: The project itself was a challenging one since it was not only an important archaeological unit in an unexplored area, but also because the circumstances demanded salvage technics little used at that time. This was one of the first uses of a bulldozer in the eastern United States on such a project, and while it was perhaps used with a certain hesitation in 1948, subsequent use of power machinery by the River Basin Surveys and others has continued to demonstrate its versatility in archaeological work. The presentation of the report leaves little to be desired. The text is well organized, with line drawings (maps, profiles, plans) and tables. Six plates illustrate a selection of artifacts found, as well as stages in excavation and representative mound features. The permanent contribution of this work is at least twofold. The report presents excavation and artifact information supporting Solecki's conclusion that this is an Adena component from an area where Adena was unknown in any detail. Also, the project was a stimulus to local people, with Solecki's contact and suggestions leading to the formation, in 1949, of the West Virginia Archeological Society.

With primarily local considerations in mind, a main value of this report is the fairly complete trait list which enables us to build our local inventory of Adena culture on a sound basis. The fact that no house pattern was discovered under the mound and the presence of certain traits new to Adena (¾-grooved ax, birdstone, and boatstone) indicate that general Adena trait lists will have to be modified by the variations to be found associated with the several known "centers." Solecki concludes that Natrium is late in the Adena period, primarily on the basis of the Central Ohio Valley trait list compiled by Webb. At the same time it can be shown that at least "eight of the Natrium Mound material culture traits cover a wide span ranging from early Adena to Middle Hopewell." This conflicting situation indicates, at least to the reviewer, that more work is needed on local sequences. Such work has been started in the Upper Ohio Valley with the Natrium mound, and subsequent study of local Adena is being carried out at Carnegie Museum.

The appendices contain significant information. Solecki wisely gathered a large number of soil samples. Not only was this helpful in deciphering mound construction features, but also in determining the nature of certain features. Drainage and texture of the mound were unfavorable for the preservation of skeletal material. Analyses to determine bone phosphate content demonstrated that several features lacking osseous material were, in fact, originally burials. Copper artifacts were rather numerous; metallographic and metallurgical studies carried out at the National Bureau of Standards indicated that the copper beads were not cold worked, but, rather, were hammered out of moderately heated copper.

This report is a valuable addition to the general body of Adena site reports and especially welcome as an addition to the rather slim body of records for Adena in the Upper Ohio Valley.

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Sculptured Monuments from Caracol, British Honduras. LINTON SATTERTHWAITE, JR. The University Museum, Bulletin, Vol. 18, No. 1, Philadelphia, 1954. Pp. 3-45, Figs. 1-42.

Removal and Restoration of the Monuments of Caracol. HORACE WILLCOX. The University Museum Bulletin, Vol. 18, No. 2, Philadelphia, 1954. Pp. 47-72, Figs. 43-67.

The Classic Maya site of Caracol, in the Cayo District of British Honduras, is rich in the number of its stone monuments. Approximately 20 stelae and 17 carved altars were discovered through the 1950-53 seasons. These monuments would appear to date at least from 9.5.0.0.0 to 10.1.0.0.0; their span may even have been from 9.3.0.0.0 to 10.3.0.0.0. Unfortunately, many of them were recovered in highly weathered and fragmentary condition. Satterthwaite's article is "concerned with the restored pieces as ancient works of American Indian art and science" (p. 4). The removal of a number of the monuments from the site and the subsequent restoration of several are described by Willcox.

Satterthwaite's article supplements and amends his 1951 account of explorations at Caracol, "Reconnaissance in British Honduras" (*Univ. Mus. Bull.*, Vol. 16, No. 1). A resumé is given of the 1951 and 1953 field seasons. The most detailed remarks concern the dating system used on the "giant-glyph" altars. Thirteen or 14 in number, these monuments are noteworthy for the presence of enormous Ahau signs with numerical coefficients. In his 1951 report, Satterthwaite held that the giant-glyph altars gave dates in the Short Count in a way wholly comparable to that current in 16th century Yucatan. His position is modified slightly in the present paper. Seemingly, as half-katuns as well as completed katuns were recorded, reference was sometimes made to a katun which had not yet run its course at the time of the altar's dedication. Additional evidence calling for modification of the original "katun-naming" hypothesis is presented. An intimate relationship in the recording of a date is seen often to have existed between a stela and its altar, the large glyph on the latter emphasizing a portion of the stela's normal, Long Count inscription. Other changes from the 1951 article are new dates or preferred dates for Altars 3, 6, and 7 and data showing that the giant-glyph idea was not confined to Caracol.

Sculptured designs on the monuments are also discussed by Satterthwaite. Although he does not mention here their artistic affiliations within the Classic tradition, the majority of the sculptures, as would be expected, are clearly Petén in character. Satterthwaite calls special attention to the highly atypical serpent design which dominates Stela 18. Extended comment is given the arrangement of glyph blocks on the monuments; it was a common practice at Caracol, but rare if not entirely absent elsewhere, to place the inscription in a series of "rounded-rectangular" frames.

Several important contributions are made in Satterthwaite's paper, which anticipates the fuller presentation promised in a final study. (1) As a result of the new findings, the dating system connected with the giant-glyph altars appears as a locally distinctive variation on a Classic pattern rather than as a late Yucatecan method which co-existed at Caracol with the normal Long Count. (2) The functional relationship of the stelae and their associated altars is discussed from several points of view. The altars were sometimes ambiguous as to their date, but Satterthwaite concludes that "if a giant-glyph altar did not speak clearly for itself, it served a stela which did so" (pp. 35-6). The size, shape, and decoration of the altars are correlated with association or nonassociation with stelae, while the spatial arrangements of altar and stela are also discussed in detail. (3) Prompt illustration of a number of heretofore unpublished monuments adds to the available body of representational art and hieroglyphic texts from the Classic Maya area.

Willcox gives a popular although detailed account of the problems faced in moving the heavy sculptures and readying them for shipment to Belize and the United States. The success of these operations is attested by the fact that "even the most fragile feather-edges of the fragments" came through without harm (p. 62). The repair of 5 of the monuments prior to museum display, involving the assembling of pieces ranging from a ton and more in weight to postage stamp size, is also described. The article has practical significance for anyone directly concerned with the crating or restoration of stone sculptures.

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NOTES AND NEWS

GENERAL

The Society for American Archaeology is sponsoring 4 archaeological seminars this summer, a program made possible by the generosity of the Carnegie Corporation of New York, as reported in April. About 30 archaeologists are participating. The seminar subjects, as formulated in March when this issue went to press, are as follows:

Cultural stability and instability over long periods of time and through space. The seminar will examine criteria for defining stability, both qualitatively and quantitatively; will review the tacit assumptions concerning stability and instability in archaeological writing, particularly in America; will summarize existing evidence of regular relationships in the area of cultural stability; and will attempt to formulate hypotheses of validation by future research. This seminar will be held in Ann Arbor, Michigan, with Emil W. Haury as chairman.

Prehistoric culture contacts, as revealed in American archaeological data. It is planned to define the peculiar historical circumstances surrounding specific examples of contact and to explore similarities and differences between various examples. Both formal description and functional analysis of prehistoric events will be undertaken, with the ultimate objective of elucidating cultural process. This seminar will be held in Cambridge, Massachusetts, with Gordon R. Willey as chairman.

Nomadic versus sedentary culture patterns, a time-depth study of ecological, socio-political, and religious aspects. Using existing ethnographic data as a point of departure, the problem will be investigated in the chronological depth provided by archaeology, seeking common patterns that are linked to mobility of residence or lack of it. This seminar will be held in Washington, D.C., with Richard Beardsley as chairman.

The American Southwest as a problem in cultural isolation. The seminar will examine the assumption that these cultures resulted from local acceptance and development of generalized and/or specific traits which can be isolated in distant cultural contexts at earlier times than their climactic developments can be observed in the Southwest. This seminar will be held in Santa Fe, New Mexico, with Jesse D. Jennings as chairman.

PACIFIC COAST

Charles Borden of the University of British Columbia has announced tentative plans to conduct salvage operations during the summer at the important Marpole (Eburne) site in the Fraser delta region. The proposed construction of a hotel may mean that this summer will be the last opportunity to work at the site.

The annual Northwest Anthropological Conference was held in Seattle at the University of Washington on the 15th and 16th of April. A number of papers on archaeological research in western North America were presented.

Douglas Osborne of the University of Washington reports that the important Wakemap site at The Dalles on the Columbia River has finally been acquired by Army Engineers. Federal possession of the area means that the looting of the site by relic hunters can be controlled. Although no definite plans have been made, Osborne has applied for permission to conduct further excavations at the site. Excavations of the past 2 years were conducted by Warren Caldwell under grants from the National Park Service.

Chester A. Chard, a specialist in the archaeology and ethnology of northern Asia, spent the winter and spring quarters on the staff of the Department of Anthropology, University of Washington. Chard's doctoral thesis on "Kamchadal Culture and Its Relationships in the Old and New World," will be published in the *University of California Publications in American Archaeology and Ethnology*.

At the University of Oregon, Luther Cressman has completed a full-length monograph on "Klamath Prehistory." Cressman has reported tentative plans to continue excavations in The Dalles reservoir area during the summer.

The University of Utah Department of Anthropology is planning to conduct its Summer Field School in Archeology in the region between Ferron and Salina, Utah, under the direction of Jesse D. Jennings. Charles Dibble is continuing his translations of the Sahagun Codex, Book V. James H. Gunnerson will be conducting an archaeological reconnaissance during the summer in the southeastern quarter of Utah, for the University of Utah Statewide Archeological Survey. Jesse D. Jennings has completed his appraisal of the archaeological resources and potential of the Plains for the National Park Service. Two archaeological numbers of the *University of Utah Anthropological Papers*, edited by Robert Anderson, will soon be ready for distribution. These are a reissue of John Gillen's "Archeological Investigations in Nine Mile Canyon, Utah" and a report of "Archeological Excavations in Beef Basin, San Juan County, Utah" by Jack Rudy.

Continuation of the archaeological survey of Death Valley National Monument during the winter and spring, was reported by William Wallace of the University of Southern California. Wallace also reported that salvage excavations were carried out during the spring at 3 shell middens at Seal Beach, Orange County. Graduate students Jack C. Collins, Roger J. Desautels, and Peter Redwine, were in charge of the operation. The destruction of sites in the Los Angeles area by building and highway construction is constant, and, as yet, no adequate salvage program has been developed.

A number of archaeological projects have been carried out recently by crews from the University of California at Los Angeles. A salvage investigation of one of the Southern California "cairn" sites was made at Saticoy by Charles Rozaire and Mildred Wissler. The site, discovered in a field-leveling project, conformed to the known pattern for such sites in having a concen-

tration of some 150 metates. Some of the metates are killed, but the majority are not. Due to the scarcity of other objects at these sites, their dating and function are not clear.

The archaeological field class at U.C.L.A. has been working in a historic Chumash village site near Oxnard, California.

In January, a crew of 15 students under C. W. Meighan worked a historic Luiseño village in northern San Diego County. The site is stratified into prepottery and pottery periods, and gives some evidence that pottery is a quite recent innovation in this part of California. Plans are being made for restoration of the Indian village and conversion of the site into an archaeological park.

Meighan also reports that an archaeological survey of the Tehachapi area is under way with E. V. Winans in charge of the work. The region is important because it stands at the junction of 3 quite different archaeological regions: the desert, southern coast, and San Joaquin Valley.

M. R. Harrington has completed the report on the Southwest Museum's excavations near Little Lake, California. The report covers several season's work at the site, 2 of them in cooperation with the University of California at Los Angeles. This site, also known as the Stahl Site, was occupied by Pinto Basin people, and shows some ties with the ancient Silver Lake-Lake Mohave material.

The Archeological Survey Association of Southern California is continuing an active reconnaissance program in the desert area. Survey teams are concentrating on ferreting out the archaeological history of the many Pleistocene lake basins of the Mohave and Colorado deserts. B. E. McCown and his team, assisted by Carl Hubbs of Scripps Institution, are working along the shorelines of Lake LaConte (Blake Sea). Trails, house circles, and artifacts of several diverse cultures are enabling this group to compile new data.

The Survey Association announces that a major publication will be forthcoming soon: a complete report, amply illustrated, on work done at the Zuma Creek Site, one of the large coastal sites in Los Angeles County. The author is Stuart L. Peck, the Survey Association's Technical Director.

SOUTHWEST

Five universities will be conducting archaeological field schools in the Southwest during the summer of 1955. The University of Arizona, by the time this comes to your hands, will be over half way through its tenth summer of excavation at Point of Pines on the San Carlos Indian Reservation. The University of Colorado Field School will be again excavating in Mesa Verde National Park. The work will be in Pueblo II and Pueblo III sites on top of the mesa. The University of New Mexico will be excavating in Pottery Mound, in the Gallina area, and at the recently tested Lucy site in the Estancia Valley east of Albuquerque, where paleo-Indian material, including Sandia, Folsom, and Clovis points have been uncovered. U.C.L.A.'s summer field school will return to Cedar City, Utah. The work will be a continuation of the 1954 investigation of marginal Pueblo sites and will be under the direction of C. W. Meighan. The University of Illinois will be conducting its fourth cooperative expedition with the Museum of Northern Arizona, at the Pollock site which was partially excavated 2 years ago. This is a late Sinagua site, dating from about A.D. 1300, and represents the end of the culture in this area.

Kenneth Stewart, of Arizona State College at Tempe, reports that he has begun excavation of a classic Hohokam site near Mesa. This is being excavated as part of the classwork in archaeology at Tempe.

Gordon Vivian has been excavating and stabilizing the "schoolhouse wing," part of the old cloister at Tumacacori mission. Charles DiPeso, of the Amerind Foundation, hopes to have the material from the contact site of San Cayetano del Tumacacori, in the Santa Cruz Valley, ready for publication during the summer. This is the first Hohokam site which successfully closes the gap from 1400 to 1700 in our knowledge of the prehistory of this area.

In northern Arizona Robert C. Euler will have completed excavation by July of a historic Walapai open site in the Matawidita Canyon in the northwest portion of the Walapai Reservation.

During the summer William Beeson will be making an archaeological survey of the upper Little Colorado, Zuni, and Puerco rivers, covering the area east to the New Mexico line, west roughly to the town of St. Joseph, and south to the Mogollon Rim.

Charlie R. Steen of the National Park Service, in collaboration with the Museum of New Mexico and the State Game and Fish Department, dug in late March an early man site threatened by a small reservoir project near Clayton, New Mexico.

Paul Martin reports that the results of last summer's excavations will be completed prior to the Chicago Museum Expedition's return to the West. An intensive study by Elaine Bluhm of all the decorative pottery from the 11 Museum expeditions in the Reserve area is nearing completion. Paul Martin and John Rinaldo will spend a final season at the Pine Lawn Valley camp of the Chicago Natural History Museum, which was established in 1939. During the summer Martin will be looking for a new campsite somewhere to the west.

Stanley Stubbs reports that the Museum of New Mexico and the Laboratory of Anthropology have completed plans for an archaeological-ethnological survey in the Sierra Madre region of Mexico, to be conducted in cooperation with the University of Michigan during the summer of 1955.

The main project at the Laboratory of Anthropology during the winter of 1955 was an archaeological study of the old San Miguel Church in Santa Fe. The Laboratory was requested to give technical assistance and advice on studies of the old structure to try to determine the building date, rebuilding, and remodelings that have gone on in it since the founding of Santa Fe. This is

turning out to be an interesting application of archaeology to a living structure.

The dates of the 1955 Pecos Conference at Santa Fe have been tentatively set for August 15, 16, and 17. At present the U.S. Indian School does not think it will be able to have rooms available for the group, so it looks as if those who wish to attend had better make their hotel reservations early.

NORTHERN MISSISSIPPI VALLEY

The Illinois State Museum is returning to the Modoc rockshelter to conduct further excavations for the following purposes: (1) to obtain more archaeological material from the lowest portions of the site; (2) to determine if there was any paleo-Indian occupation of the site; (3) to obtain more samples for radiocarbon dating; (4) to study soil conditions, profiles of the deposits and faunal remains in order to determine the nature of the climate and other factors during the occupation of the site. The party is under the direction of Melvin Fowler and will be in the field until August 13.

The Southern Illinois University Museum is conducting excavations of several Archaic sites on the Cache River in southern Illinois, under the direction of J. Charles Kelley and Howard Winters.

The Department of Sociology and Anthropology of the University of Missouri is conducting its ninth field session which will continue through August 5. Excavations will be made on a Boone focus campsite and burial mound near Graham Cave and in the Missouri Indian village site near Marshall, Missouri. Work continued full speed in the Table Rock Reservoir area during the fall and spring, and the University field team, consisting of Robert T. Bray and Richard A. Marshall, conducted a number of float trip surveys to complete the reconnaissance of the area site locations. The total number of sites located in the Table Rock Reservoir area now exceeds 400 and it is estimated that more than 500 will have been found when the surveys are completed. During the fall of 1954, excavations were conducted on 3 more of the shelters in the area. The excavation of another shelter and the testing of an open site was completed under the National Park Service grant before the close of work on June 1. Robert T. Bray will continue to conduct research in the area for the University during the summer and fall. Early in the year a salvage trip was made to a burial mound being bulldozed in southeast Missouri. The destruction had already taken place by the time the party arrived but it was successful in securing information concerning 5 burials, 4 of which were bundle burials and 1 fully extended. The associated pottery appears to be similar to that of the New Madrid focus.

The Kansas City Chapter of the Missouri Archaeological Society prepared a display of the materials excavated from the Renner site last summer and at a special meeting March 6 presented the entire collection to the Kansas City Museum. The chapter members, under the direction of Leo J. Roedl and J. Mett Shippee, are writing a report for publication on the Renner site.

The Greater St. Louis Archaeological Society, under the direction of Leonard W. Blake and advised by Preston Holder of Washington University, has been doing salvage work on a Woodland and Mississippi village site that will be destroyed by highway construction before summer.

The Ozarks Chapter of the Missouri Archaeological Society has stepped up its survey of the Fellows Reservoir area on the edge of Springfield, Missouri. This survey, under the direction of Harold J. Retallick, has resulted in the reporting of about 35 sites to be affected by construction of the city reservoir now under way. The chapter has also readied and submitted to the Missouri Resources Museum in Jefferson City a display of Archaic cultural material from the Ozarks region. This material will be arranged by the museum staff and placed on display in the State Capitol for a year.

The Springfield Art Museum has recently purchased 880 manuscripts written in the 1880's by S. C. Turnbo that deal with the early history of the White River country of Missouri and Arkansas. Marvin Tong, Jr., was given permission by the museum to excerpt the data relating to the early historic Indian tribes. This project has been completed and preparations are being made to put the material in shape for publication in the *Missouri Archaeologist*. The manuscripts have produced heretofore unknown information about the Shawnee, Delaware, Miami, and Cherokee that resided along White River in Missouri and Arkansas in the 1820's and 1830's. Very valuable information was found in the documents concerning John and Peter Cornstalk, sons of Chief Cornstalk of the Shawnee, as well as John Rogers of the Cherokee.

NORTHEAST

Richard McCarthy reports that the newly-formed Niagara County Historical Society has been given an old house in Lockport, N.Y., to be used as a museum and meeting place. They have received on permanent loan an important collection made from archaeological sites in Erie and Niagara counties. A study of this material has indicated that Owasco and some earlier pottery types occur in these western counties of New York. It is hoped that the society will make much of this material available to students of this area.

SOUTHEAST

Hale G. Smith reports continued activity by the Florida State University Department of Anthropology during the 1954-1955 academic year. Student digs were conducted at a number of sites in the Tallahassee area including the Tucker site, tested by C. B. Moore and G. R. Willey; the Beatty site on the Aucilla River, which produced Leon-Jefferson period ceramics and Spanish sherds; and the Pine Tuft site where a burned warehouse, previously excavated in part by Smith, yielded a large number of sherds of the Spanish-Indian period and a considerable amount of food products.

A forthcoming number of the *Florida State University Studies* will contain papers by Griffin and Smith on the Cotton site, Fairbanks on the Buford Reservoir site 9HL64, Allen on archaeological excavations in central northwest Florida and Van Stan on weaver education in ancient Peru. Another paper by Miss Van Stan on peruvian textiles from the Carter collection will be published as number 3 in the department's *Notes in Anthropology*.

Fairbanks' report on the excavation of Mound C at Macon is now in press as number 3 of the National Park Service *Archaeological Research Series*. He has also completed a report on the Hawkins-Davidson houses at Frederica on St. Simons Island, Georgia, which will appear shortly in the *Georgia Historical Quarterly*.

A number of dugout canoes have been discovered as a result of low water levels in various parts of Florida. One has been donated to the University and experiments are being conducted in strengthening processes for large, waterlogged objects. A collection gathered by a local citizen from gas-line ditches at Fort Walton included 2 Poverty Point objects. An attempt will be made to locate a workable site containing these objects.

Joseph Caldwell was detailed in February from Ocmulgee National Monument to investigate a prehistoric and French-Indian contact period site near Fort Caroline National Monument, Duval County, Florida. He reports that considerable data will be forthcoming.

The Georgia Historical Commission and the University of Georgia were active in archaeology through 1954-1955 according to a report from A. R. Kelly. L. H. Larson returned to the Georgia coast in February and March to carry out salvage excavations at Harris Neck, McIntosh County, a site threatened by Naval Air Base expansion. Pottery recovered is related to a late constal series outlined by Larson in earlier surveys and known in considerable detail from the work of Sheila K. Caldwell at the near-by Darien Bluff site. Dates for associated Spanish Majolica cluster around 1635 according to a preliminary report from John Goggin.

Sheila K. Caldwell has completed a manuscript on her 2 seasons of work at the Darien Bluff site. A. R. Kelly and Edward Beam, graduate student, reported excavation of a stone mound at Dahlonega in a paper read before the Georgia Academy of Sciences. Vincenzo Petrullo summarized results of excavations at the Eatonton Stone Eagle effigy site. Some data were recovered.

A. R. Kelly and Vernon Hurst, of the Georgia Geological Survey, have collaborated in the laboratory study of the micro-structure of weathered or modified flints from South Georgia sites and blue cherts or flints from North Georgia Archaic sites.

Joseph J. Gaines, a University of Georgia graduate student, has completed a surface survey of the area between the upper Savannah and Broad rivers. A surprisingly heavy Stallings Island period occupation was noted.

An exhibit on "Highlights of Georgia Archaeology" was presented in the Georgia Art Museum during February and March. Two marble statuettes and other Southern Cult paraphernalia, excavated with burials from the slopes of Etowah Mound C by Larson in 1954 were featured. The same materials were also displayed in the Columbus Museum of Arts and Crafts and the Georgia State Museum in Atlanta.

A. R. Kelly and Joseph Caldwell visited the Rudd Plantation site near Georgetown, Georgia, during the winter, a site described as a sort of miniature Moundville by C. B. Moore who was unable to secure excavation permission. Surface collections have been identified as pure Fort Walton. Both this site and the Stanley site near Fort Gaines are threatened by proposed federal dam and reservoir construction.

Excavations at the Cherokee capitol of New Echota have been completed. A report for the Georgia Historical Commission and Gordon County sponsors who have purchased the site for development and preservation is being prepared by Clemens De Baillou.

The program for reorganization of the University of Kentucky Museum of Anthropology, begun by Raymond H. Thompson 3 years ago is now nearing completion. The building has been completely renovated; collections have been ordered and stored in new cases where they are available for study; the catalog is being reorganized to increase its utility; the first of a series of new exhibit cases have been built and are being furnished with displays of Archaic and Adena materials. Present plans call for opening the new museum to the public early in May.

James A. Ford returned to the Poverty Point site in the early spring to undertake major excavations. With the March publication of the Jaketown report (*Anthro. Papers of the Am. Mus. of Natl. Hist.*, Vol. 45, Pt. 1) the Poverty Point excavations assume added importance and interest.

The Emerald Mound (Selzertown), second largest Temple Mound in the United States, has been stabilized and readied for public interpretation as a feature of the Natchez Trace Parkway. Visitors to the site, 9 miles northeast of Natchez, Mississippi, will find parking facilities at the foot of the primary platform and a pathway leading to the 5 acre top platform where interpretive facilities will tell the story of the mound as disclosed by archaeological tests in 1949.

In the National Park Service, archaeological investigations in connection with the 350th anniversary of the founding of Jamestown, Virginia, are being pushed on a year-round schedule. Centered at Colonial National Historical Park and supported in part by financial assistance from the Virginia state and federal celebration commissions, operations during the winter and spring months have produced the following results:

1. In previously unexplored portions of "James Citty," on Jamestown Island, a series of pits dug for unknown purposes and filled with 17th century refuse has produced a wealth of artifacts characterizing the life and

times of the period. Included are a cuirass with breast and back plates, a swept-hilt sword, a basket hilt from a sword, portions of firearms, a series of ceramics, some representing the first of such industry in Colonial history, and some notable structures. A large mansion-type house (possibly the long-lost Second Statehouse) and a structure which may be the first recorded bakery were in the process of excavation by John L. Cotter and Edward B. Jelks at the present writing.

2. Foundations of the Third and Fourth State Houses, Jamestown Island, and the foundations of Governor Berkeley's original 17th century plantation house at Greenspring have been uncovered for measured drawings by Louis R. Caywood. This work was accomplished by the National Park Service for the State of Virginia Jamestown Celebration Commission. In the process of revealing the foundations and testing in the vicinity, a previously unreported burial ground was discovered at the Third and Fourth State House site, and representative 17th century artifacts and a pottery kiln were unearthed at Greenspring.

3. Search for underwater and land traces of the first fort established at Jamestown after the 1607 landing has been carried out by Joel L. Shiner with the aid of funds contributed by the Federal Jamestown-Williamsburg-Yorktown Celebration Commission. At the writing, the first fort has not been found, but information obtained will at least allow informed and unequivocal statements to be made concerning the location of the first soil occupied by the first successful English settlement.

4. In March Edward B. Jelks undertook to trace the British defense positions before Yorktown as they lie beneath Confederate earthworks. These investigations are related to the development of a new interpretation center on the 1781 battlefield.

It is expected that efforts during the summer will be directed toward investigations on Jamestown Island, where extensive developments to be finished by 1957 include a modern museum and interpretive center. Laboratory operations and research will be carried on under the direction of J. Paul Hudson, National Park Service museum curator and specialist in 17th century arts and crafts.

At Independence Hall National Historical Park, Paul J. F. Schumacher has been conducting salvage investigations in ground being cleared for inclusion in the park in the heart of Philadelphia. Search has also been made for forgotten structures on the site of Independence Square, with good results. The outstanding achievements, so far, have been the discovery of Benjamin Franklin's house and a large quantity of artifacts relevant to the period of the founding of the Nation.

LOWLAND SOUTH AMERICA

The first systematic excavation of a Guaraní site in southern Brazil is being carried on under the direction of Fernando Altenfelder Silva of the University of Paraná, assisted by Oldemar Blasi, Iroshi Saito, and Carlos Moreira Netto. The site, Estirão Comprido, is on the left bank of the Rio Ivaí, a tributary of the Rio Paraná. It occupies an approximately circular area 70 m. in diameter, with a refuse deposit 95 cm. in maximum thickness. In 1954 exploratory trenches were excavated in the center and at the edges to determine the extent and composition of the deposit. In January, 1955, further work was done to clarify some of the problems raised by the earlier tests. The identification of the site as an accumulation of habitation refuse is based on the presence of lenses of shell and of abundant remains of bird, mammal, and fish bones, many of them burned. Four burials were encountered in the trenches. Artifacts of stone representing chipping and polishing technics included axes, scrapers, flakes, and mortars. Bone objects included awls, necklaces, and one fishhook. Pottery was present in all levels and preliminary analysis indicates distinct changes through time, with the thick, plain, poorly made pottery of the lower levels giving way to the typical polychrome equated with the Guaraní in the middle levels. Incision, typical of Kaingang ceramics, appears near the top of the deposit. A relatively abundant pottery artifact is a pipelike object composed of a small bowl with a tubular attachment to the upper wall at one side.

The excavation of this site should provide us with much needed information on the prehistoric sequence in a part of Brazil that is archaeologically almost completely unknown, and provide definite evidence on the antiquity and character of Guaraní culture in the state of Paraná.

Vilma Chiara of the Museu Paulista, Brazil, has provided information on a hitherto unreported site at Manacapurú on the left bank of the Rio Solimões, 108 km. above Manaus. The present town is located on 2 hills, both of which produce sherds. Vessels are reported to have been unearthed in the intervening depression during the construction of the foundation for the town hall. No excavations were made when the spot was visited in 1954, but sherds were abundant in the eroded river bank and occasional complete vessels are found when a section sloughs off. Other sites were found in gardens outside the town, but these do not appear to be useful for stratigraphic excavation because of the agricultural disturbance, which has caused modern ceramics to penetrate to the lowest levels.

Complete vessels and sherd samples were sent to the Museu Paulista. Pottery artifacts include a flat, rectangular stamp with a stubby handle and a complex incised design on the face, a spindle whorl, and small pestles. The vessel shapes and decoration are said to be highly repetitious and stereotyped. Common vessel shapes are bowls with a small base and broadly outflaring sides and carinated jars. Decoration is by low relief or painting in geometric patterns of meandering lines. This ceramic complex is unlike anything previously reported from the Amazon area and its origin and affiliations are at present unknown.

In January and February of 1954, the first archaeological investigations were conducted in the Departamento de Rivera, on the right bank of the Rio Negro in the northeastern part of Uruguay. Sites were discovered during the draining of swamps for agricultural purposes by the Instituto Nacional de Colonización, and the Sociedad "Amigos de la Arqueología" was requested to send a delegate to examine them. José Joaquin Figueira was appointed, and he was assisted by Julio Cesar Zerboni representing the Instituto. About 300 mounds were located. Three that were to be destroyed in the construction of drainage canals were excavated, each about 30 m. long, 15 m. wide, and 3 to 4 m. high. Stone tools recovered from the refuse included knives, scrapers, drills, sling stones, club heads, and mortars. Potsherds were abundant, some with incised decoration. Several human skeletons were encountered, all in a very poor state of preservation. A wooden arrow fragment represents the first wooden object from an archaeological site in Uruguay. The significance of this work lies in the extension of the distribution of these mounds, previously known from the nearby Departamentos of Cerro Largo, Treinta y Tres, and Rocha. They are of pre-European origin, and may be associated with the Arechane Indians, who occupied the area until the 16th century.

The undertaking of salvage archaeology of the type described above is evidence of the scientific status that archaeology has achieved in Uruguay. There are 2 official institutions whose activities have brought this situation about, the Museo Nacional de Historia Natural and the Sociedad "Amigos de la Arqueología." The objective of the latter is well stated in a recent publication of the society, and could serve as a motto for archaeologists anywhere: "This is our goal: To offer to the general science of archaeology the support of a vigorous national archaeology. The possibility of achieving comparative archaeological results of international scope depends on the judgment and honesty with which archaeology is undertaken in each country. Here lies our responsibility."

HIGHLAND SOUTH AMERICA

During the months of January and February Richard P. Schaedel conducted a series of tests to date large ceremonial sites and population centers between the Motupe and Culebra valleys of Peru. He worked in collaboration with Rodriguez SuySuy and Lostaunau, inspectors of ruins for the Viru-Santa and Jequetepeque valleys respectively. On the first phase Schaedel, accompanied by Stumer, checked Uhle's Chimu-capac site in the Supe and Chancayillo in the Casma. It is tentatively concluded that both sites are extraordinarily well preserved examples of a castillo with concentric walls of the Tiahuanacoid period. A miniature example of the same form was studied in the Culebra valley. The second phase of the work consisted in testing the urban lay centers north of Chicama for relative age, and a check was made also on Inca and Chimu (provincial elite) sites in the Nepeña and Santa valleys. A systematically excavated collection of ceramics from the Hacienda Pabur in Piura in the possession of Sr. Haemmerle of Jequetepeque was examined. Three periods are distinctly represented: middle Lambayeque II (Bennett), Chimu, and Inca. The material was excavated from one large burial ground with no associated architecture.

Sr. Alvarez, former assistant in the Instituto de Antropología of the University of Trujillo, has been excavating the Huaca Sacachique near Laredo in the Moche valley. He has found abundant ceramic and architectural (including friezes) evidence for an important pre-Mochica building period here.

A new Gallinazo type frieze, so far the best preserved and most extensive, was uncovered last year in the Licapa site of the Chicama Valley, Peru. Sr. Oscar Lostaunau took measurements and photographs before the frieze was recovered with sand by the Patronato Arqueologico de la Libertad.

Frederic Engel initiated systematic excavation of shell mounds in the lower Chilca valley south of Lima. The upper levels indicate Late period local occupation.

The Peruvian Dirección de Arqueología conducted test cuts in Ancon where earth-moving machinery of the urbanization company revealed sections of an early but post-Chavinoid level of occupation. Sr. Casafranca, under the supervision of Dr. Muelle, is conducting the excavation for the purpose of obtaining a large collection of sherds for comparison with Chavinoid and immediately post-Chavinoid manifestations on the central coast.

A UP dispatch from Salta dated the 24th of February reports the results of the fourth expedition to Llullay-Yaco, 6000 meter-plus peak on the frontier between Chile and Argentina. The expedition headed by Colonel Hans Rudel confirmed his previous claims that prehistoric ruins exist near the summit. Moving pictures were taken. The dispatch made no mention of the type of material encountered. On a previous expedition Rudel photographed some stone buildings and brought back crude undecorated pottery found in the vicinity which he donated to the Argentine government.

SOME RECENT PUBLICATIONS

As in the past, this feature is contributed by the various Assistant Editors for their respective regions. The coding and arranging of the cards they sent in has been done by Robert E. Winter and the final typing by Esther M. Banks, both graduate students in anthropology, Columbia University.

The following abbreviations are used in the references:

A	*Antiquity*. Newbury, Berkshire, England.
AA	*American Anthropologist*, n.s. Menasha.
AA-SI	*American Anthropologist, Southwest Issue*, Vol. 56, No. 4, Pt. 1, August, 1954. Menasha.
ABC	*Anthropology in British Columbia*. Victoria.
ABT	*Archivos de Biologia e Technologia, Instituto de Biologia e Pesquisas Technológicos*. Curitiba, Brazil.
AH	*Arizona Highways*. Phoenix.
AJB	*American Journal of Botany*. Philadelphia.
AMNH-AP	*American Museum of Natural History, Anthropological Papers*. New York.
Ar	*Archaeology*. Cambridge, Massachusetts.
ASC-B	*Archeological Society of Connecticut, Bulletin*. New Haven.
ASV-QB	*Archeological Society of Virginia, Quarterly Bulletin*. Staunton.
BAE-B	*Bureau of American Ethnology, Bulletin*. Washington.
BBAA	*Boletin Bibliográphico de Anthropologia Americana*. Mexico.
BHUM	*British Honduras University Museum*. Belize.
BIA	*Boletin del Instituto de Antropologia*. Bogotá.
BSAP	*Boletin de la Sociedad para la Antropologia Peruana*. Lima.
CA	*Cuadernos Americanos*. Mexico.
CGJ	*Canadian Geographical Journal*. Ottawa.
CIW-CR	*Carnegie Institution of Washington, Department of Archaeology, Current Reports*. Cambridge, Massachusetts.
CIW-NMAAE	*Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*. Cambridge, Massachusetts.
CIW-P	*Carnegie Institution of Washington, Publications*. Washington.
CM-AN	*Carnegie Museum, Archaeological Newsletter*. Pittsburgh.
CNHM-B	*Chicago Natural History Museum, Bulletin*. Chicago.
CS	*Ciéncles Sociales*. Washington.
CSAJ	*Central States Archeological Journal*. Quincy, Illinois
E	*Ethnos*. Stockholm.
EP	*El Palacio*. Santa Fe.
ESAF-B	*Eastern States Archaeological Federation, Bulletin*. Trenton.
FiA	*Fieldiana — Anthropology*. Chicago.
FlA	*Florida Anthropologist*. Gainesville.
GJ	*Journal of Geology*. Chicago.
GSB	*Geological Survey Bulletin, Georgia Department of Mines, Mining, and Geology*. Atlanta.
IAEP	*Instituto de Antropologia e Etnologia do Para*. Belem, Brazil.
IAS-J	*Iowa Archeological Society, Journal*. McGregor.
INAH-A	*Instituto Nacional de Anthropologia y Historia, Anales*. Mexico.
InAS-P	*Indiana Academy of Science, Proceedings*. Indianapolis.
ISAS-J	*Illinois State Archaeological Society, Journal*, n.s. Springfield.
K	*Kiva*. Tucson.
L	*Landscape*. Santa Fe.
Le	*Letras, Organo de la Facultad de Letras, Universidad Nacional de San Marcos*. Lima.
MARR	*Middle American Research Records*. New Orleans.
Mas	*Masterkey*. Los Angeles.
MAS-B	*Massachusetts Archaeological Society, Bulletin*. Attleboro.
MoA	*Missouri Archaeologist*, Columbia.
NMC-B	*Natural Museum of Canada, Bulletin*. Ottawa.
NWA	*New World Antiquity*. London.
NYSAA-B	*New York State Archaeological Association, Bulletin*. Albany.
OAS-B	*Oklahoma Anthropological Society, Bulletin*. Norman.
OAS-NL	*Oklahoma Anthropological Society, Newsletter*. Norman.
P	*Plateau*. Flagstaff, Arizona.
PA	*Pennsylvania Archaeologist*. Homesdale.
PIA	*Plains Anthropologist*. Lincoln, Nebraska.
PMAAE-P	*Peabody Museum of American Archaeology and Ethnology, Papers*. Cambridge, Massachusetts.
RCA	*Revista Colombiana de Antropologia, Instituto Colombiana de Antropologia*. Bogotá, Colombia.
RIAT	*Revista del Instituto de Antropologia, Universidad Nacional de Tucumán*. Argentina.
RMEA	*Revista Mexicana de Estudios Antropológicos*. Mexico.
RMIA	*Revista del Museo e Instituto Arqueológico, Universidad National del Cuzco*. Peru.
RMP	*Revista do Museu Paulista*. São Paulo, Brazil.
RSAA	*Revista de la Sociedad "Amigos de la Archeologia."* Montevideo, Uruguay.
RUC	*Revista Universitaria, Universidad Nacional del Cuzco*. Peru.
RUCC	*Revista Universitaria, Universidad Católica de Chile*. Santiago.
S	*Science*. Washington.
SA	*Scientific American*. New York.
SAP-J	*Societé des Américanistes de Paris, Journal*, n.s. Paris.
SAR-M	*School of American Research, Monographs*. Santa Fe.
SIS	*Southern Indian Studies*. Chapel Hill, North Carolina.
SJA	*Southwestern Journal of Anthropology*. Albuquerque.
SL	*Southwestern Lore*. Boulder, Colorado.
SM	*Scientific Monthly*. Washington.
SMC	*Smithsonian Miscellaneous Collections*. Washington.
SN	*Science Newsletter*. Washington.
T	*Tlatoani*. Mexico.
TA	*Tennessee Archaeologist*. Knoxville.
TAS-B	*Texas Archeological Society, Bulletin*. Austin.
UA-AP	*University of Alaska, Anthropological Papers*. Fairbanks.
UCAS-R	*University of California Archeological Survey, Reports*. Berkeley.
UU-AP	*University of Utah, Anthropological Papers*. Salt Lake City.

VFPA *Viking Fund Publications in Anthropology.* New York.

WGFAR *Wenner-Gren Foundation for Anthropological Research.* New York.

WHOM-N *W. H. Over Museum, Newsletter.* Vermillion, South Dakota.

WVA *West Virginia Archaeologist.* Moundville.

YU-PA *Yale University, Publications in Anthropology.* New Haven.

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GENERAL

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CONTENTS

	Page
Great Basin Prehistory: A Review . . . . . Jesse D. Jennings and Edward Norbeck	1
Contributions to the Archaeology of Northern Honshu. Part I, Jomon Sites in Aomori Prefecture . . . . . Howard A. MacCord	12
Alaskan Pottery: A Classification and Historical Reconstruction . . . . . Wendell Oswalt	32
Jade and String Sawing in Northeastern Costa Rica . . . S. K. Lothrop	43
A Shellmound in Marin County, California . . . D. J. McGeein and W. C. Mueller	52
The Second Sheguiandah Expedition, Manitoulin Island, Ontario . . . . . Thomas E. Lee	63
Alfred Marsten Tozzer — 1877-1954	72

FACTS AND COMMENTS

Jadeite from Manzanal, Guatemala . . . . . William F. Foshag and Robert Leslie	81
An Authentic "Problematical" from the Ozarks . . . . . Marvin E. Tong, Jr.	83
A Kiva Bell from Bandalier National Monument, New Mexico . . . . David M. Brugge	83
Pollen Analysis, A Research Tool for the Study of Cave Deposits . . Roger Y. Anderson	84
The Technic of Collecting Osteological Materials . . . . . Theodore E. White	85

BOOK REVIEWS

Rudy: Archeological Survey of Western Utah	Steward	88
Morris and Burgh: Basket Maker II Sites Near Durango, Colorado	Rinaldo	89
Martin, Rinaldo, and Bluhm: Caves of the Reserve Area	Wheat	90
Kubler: Cuzco	Rowe	92
Lavachery and Noblecourt: Les Techniques de Protection des Biens Culturels en Cas de Conflit Armé	Thomas	93
Weatherwax: Indian Corn in Old America	Galinat	93
Dockstader: The Kachina and the White Man	Beals	94
Brainerd: The Maya Civilization	Lister	94
Thompson: The Rise and Fall of Maya Civilization	Roys	95
Solecki: Exploration of an Adena Mound at Natrium, West Virginia . . .	Mayer-Oakes	96
Satterthwaite: Sculptured Monuments from Caracol, British Honduras. Willcox: Removal and Restoration of the Monuments of Caracol	Rands	97
Notes and News		98
Some Recent Publications		104

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